JUL 1 2 1928

Motorship

"A National Trade Journal"

Registered in U. S. Patent Office and abroad

Speed as steamers, 10 knots; as motorships, 13 to 14 knots

AFTER Diesel-electric conversion, the U. S. Shipping Board Steamers "Courageous", "Defiance" and "Triumph" will each be driven by 4000-hp. motor, taking current from four 800-kw. main generators, which are to be driven by four 1280-hp. McIntosh & Seymour main engines. Each engine will also drive a 100-kw. generator for excitation, auxiliary power and lighting.

These vessels will each have a displacement of 10,500 dw. tons, cargo space totaling 600,000 cu. ft. and will become modern at a considerably lower cost than for building out-and-out new vessels of equal size and speed.

Constituting as they do, the largest conversions authorized by the Shipping Board, these vessels are the most important motorships being equipped in America. The use of McIntosh & Seymour Diesels exclusively for main and auxiliary power on all three, is another of the many United States Government tributes to

McINTOSH & SEYMOUR MOTOR SHIPS

McINTOSH & SEYMOUR CORPORATION, AUBURN, N. Y.

JULY, 1928 PRICE 35c.

Generated on 2024-09-13 16:41 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Motorship

Reg. U. S. Pat. Office and abroad. Copyright 1928 by Motorship

Published on the 25th of the month prior to each title month of issue. Subscriptions: U. S. and Mexico, $4; other countries of the Postal Union, $5. Single copies 35 cents. Bound volumes of previous years, $10. Main Office: 101 West 31st Street, New York, N. Y.

Changes in advertising copy must be received by the publisher 3 weeks prior to the date of publication when proofs are desired, and orders for discontinuance of advertising must be received not later than the 1st of the month prior to the title month of issue.

Volume XIII — *July, 1928* — *Number 7*

Economy of Operating Costs of U. S. S. B. Conversions

By R. W. Crowly

In His Endeavors Not to Overstate the Case for the Motorship, Mr. Crowly Perhaps Has Been Too Conservative. More Stress Could Be Placed on the Additional Earning Power Due to the Increased Speed of the Diesel-Driven Vessels Permitting More Voyages. Amortization in Sixteen Years Would Be Possible with Today's Conditions Unchanged. — *Editor*.

SAVINGS in direct cost of operation of the Shipping Board motorvessels in the Atlantic-Australian-Indian service are not only adequate to the payment, on the Diesel conversion cost, of interest at the present Government rate of 2¾ per cent, but also can provide for a sinking fund payment at the rate of 3¾ per cent per annum, which will extinguish the cost in a period of 20 years. This it must be emphasized, is the result only of savings in cost of operation and is regardless of the potentially greater earning power of the motorships. Actually this period may be reduced, even to as short a period as 12 years, if the traffic grows quickly enough to enable the extra earnings rendered possible by the motorship to be applied to this amortization.

A contemplation of the operating economies of these vessels specifically demonstrates the benefits of the loan provision clauses of the Merchant Marine Act 1928, legislated at the last session of Congress, whereby opportunity is given to private shipowners to borrow money on such terms that similar Diesel conversions would secure net annual savings well over and above the interest payments, whereas money borrowed at a commercial rate of 6 per cent —assuming the shipowner could borrow it at that rate—is seen to be so costly that it can only just be covered in this trade by the direct Diesel savings alone.

No account is here taken of the extra gross earnings that motorships can make when full cargoes are obtainable. They can, of course, load more cargo than steamers of the same dimensions, because they can bunker much more lightly and do not have to carry feed water for the boilers. The Shipping Board's motorvessels, however, have been allocated to a new trade route which it is to the interest of this country to build up, but which is too young and undeveloped yet to furnish heavy cargo loadings. The Roosevelt Line, as managing operator with headquarters at 11 Broadway, New York, has been increasing the traffic steadily. These cargoes are general in nature consisting mostly of automobiles, case oil and other American manufactured commodities. Homeward from India the loadings are often heavy enough to put a vessel down to her marks, and the motorships then show higher gross earnings than the steamers because they carry more freight.

Let us ignore the potentially greater gross earning capacity of the motorvessels, partly because circumstances will not allow full use until the present steadily increasing traffic has reached its peak and partly because public policy dictates that the actual

Net Annual Savings and Interest Requirements of U. S. S. B. Converted Motorships

I. Government interest at 2¾ per cent and balance to sinking fund to amortize cost in 20 years.

II. Interest at commercial loan rate of 6 per cent.

III. Interest under Merchant Marine Act 1928, loan of three-quarters value from Construction Loan Fund at 2¾ per cent and balance at commercial rate, 6 per cent.

	I	II	III
Gross savings in motorship operating expenses	$37,861	$37,861	$37,861
Interest on average conversion cost $590,750	16,246	35,445	20,985
Net savings after interest charges	$21,615	$ 2,416	$16,876

Characteristics of Motorships and Steamers, the Performance of Which Is Compared on the Atlantic-Australian-Indian Service

Vessel	*Type*	*Length*	*Breadth*	*Load Draft*	*Dwt. Cap. Tons*	*Displacement Tons*	*Power*	*Distance Miles*	*Speed Knots*
ACTURUS	Ss. Oil	402 ft. 6 in.	53 ft. 0 in.	27 ft. 2¾ in.	9600	13120	2600 i.hp.	25,730	10.16
EASTERNER	Ss. Coal	385 " 0 "	51 " 0 "	27 " 1½ "	9000	12120	3000 i.hp.	25,530	10.62
CITY OF DALHART	Ms.	402 " 0 "	54 " 0 "	26 " 10¾ "	9050	13000	3000 s.hp.	25,572	12.09
SEMINOLE	Ms.	402 " 0 "	54 " 0 "	26 " 10¾ "	9235	13010	3680 s.hp.	28,107	12.02
WEST HONAKER	Ms.	410 " 0 "	54 " 0 "	23 " 11½ "	8060	12086	2700 s.hp.	27,081	10.55

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

extent to which it is now being utilized homeward should not be disclosed for the benefit of foreign competitors who are naturally trying to estimate it as closely as possible.

Let the onus of justification of the cost of conversion of the Shipping Board vessels be placed entirely on the savings in direct cost of operation, for that indeed is practically the burden that these converted ships are called upon to face by the fortuitous circumstances of service. A study of the voyages of several vessels on this route, and of the direct costs chargeable thereto yields a figure which can be taken as representative of the economy of operation. This figure is not an absolute value, but it is a very good criterion. It has limitations that will be defined, and when due regard is given to these it is as useful and dependable a figure as one can arrive at.

All the basic data have been furnished by the Roosevelt Line. They cover one round-the-world voyage each of an oil-burning steamer, a coal-burning steamer and three motorships, the respective characteristics of which are set out in an accompanying table with a summary of the distances covered in the voyages and of the mean speeds recorded. In an effort to arrive at figures which are typical of world wide ship-operating traffic and conditions, a tramp coal-burner of international type with triple-expansion steam engines, an up-to-date oil burner with similar propelling machinery, and three motorships with single-acting two-cycle Busch, Sulzer, double-acting two cycle Hamilton M.A.N. and single-acting four-cycle McIntosh & Seymour Diesel main engines respectively were selected for comparison purposes. Probably no better comparison could have been found among the ships of the Roosevelt Line, which is operating many of the Shipping Board conversions. Pages and pages of figuring were needed to arrive at the result here shown.

Of the five vessels selected there are no two alike. The oil burner and two of the motorships are very close together in hull dimensions and displacement, but differ in power. The third motorship and the coal burner differ more from them and from each other. They are not thus strictly comparable vessels that have served for the calculations, but these are the vessels on the service and it must be remembered that what we are seekng is the representative economy of these motorships in comparison with these very steamers.

The oil burning steamer is an excellent performer, and the abstract compiled by the Fuel Conservation Division of the Shipping Board, of her logs of this voyage earned the official commendation that "the fuel performance, as indicated by the 105.9 per cent sea rate and 98.7 per cent port rate, is very good and reflects credit upon the engineering personnel." Her excellence really favors the steamer side of the comparison, but that is all to the good because it exemplifies that the motorship superiority is being scrutinized very rigidly. Of the three motorvessels serving in the comparison of performances one is in the lowest powered group of the converted fleet, one is in the highest powered and the other's power is intermediate. It is, however, not power alone that accounts for the differences of speed on the voyage: the drafts had their influence on that.

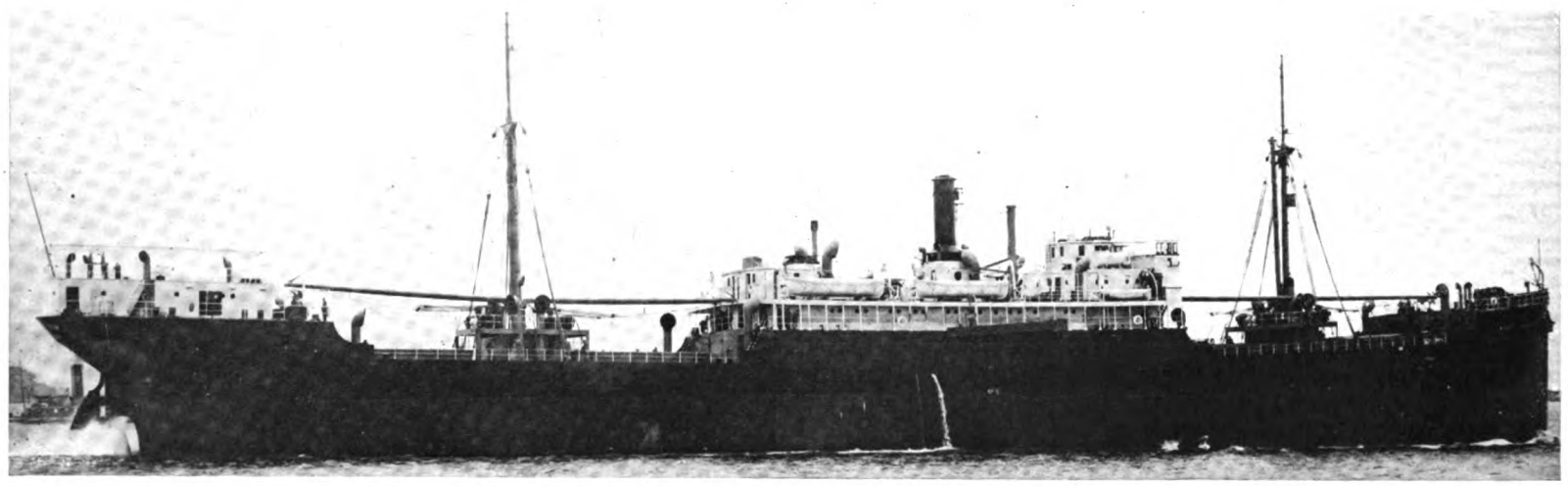
There is no need to set out here the variations in the loadings throughout the voyages. They have been carefully examined and show that the oil-burning steamer carried least cargo on every passage from beginning to end of the voyage. The small lower-powered motorship was most heavily laden, and next to her was the coal-burning steamer—not, however, on account of cargo, but because of the weight of coal added to that of the cargo. In fact the coal burner carried less total cargo on the voyage than any other of the five vessels. Weather served these ships in about the same order, WEST HONAKER drawing the roughest passages, followed in turn by the coal burner, then the two other motorvessels and the oil burning steamer.

No attempt is made to compensate for the variations in cargo loading and in weather by introducing adjustments into the fuel, oil and water consumptions or into the ship's speeds—as affecting crew's wages and the food bill—because the steamers had the best of it by and large, which is a desirable condition in such a comparison as is to be made here.

It is in the length of voyage that the first adjustment is made. All the voyages are reduced to a common basis of 26,000 miles at the respective speeds of the vessels. An equal adjustment to 3 days 18 hours between pilot stations and docks, or vice versa, is made for all, irrespective of speed—three of the vessels equalled this or bettered it. In port a uniform period of 55 days, which was equalled or reduced by three vessels, has been assumed, with consequent adjustment of fuel, oil and water consumption, crew's wages and food. The sum of these adjustments places the vessels on an even basis of comparison, but without alteration of the individual influences of sea speed and fuel and oil consumption at sea or in port that were recorded for these voyages. Substantially the effect of these adjustments is to regard the five vessels as having made exactly the same voyage, calling at the same ports for the same length of time and encountering the same weather conditions.

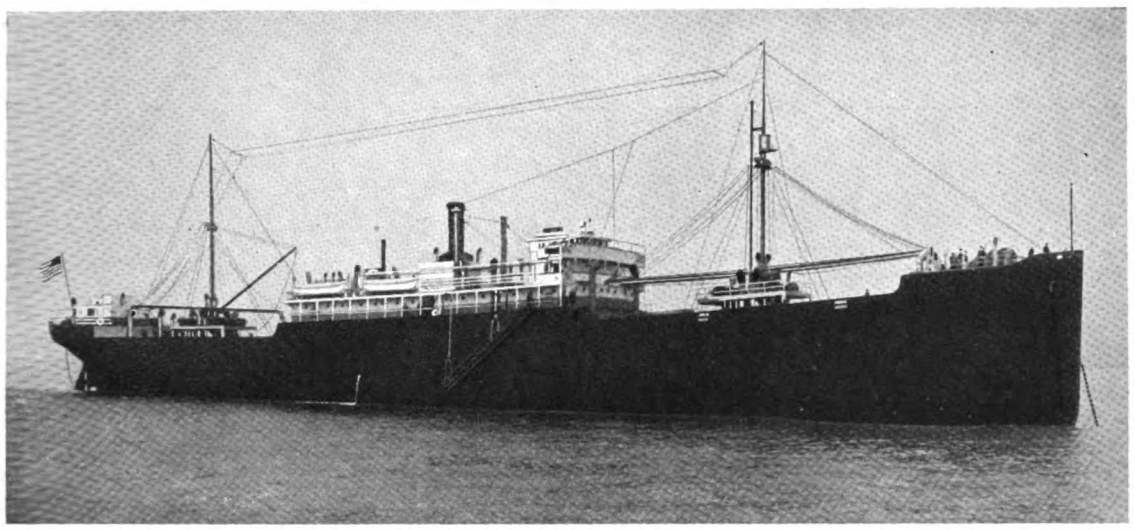
Under the item of repairs there has had to be discrimination. Work has been done on the machinery and installation of some of the motorships that is attributable to their newness. Betterments have been introduced which will improve performance. This applies to engine room auxiliaries and deck machinery as well as to main engines. Since the vessels left the shipyards after modernization and conversion all such work has been charged to repairs. For the purpose of this comparison, there has been segregated these items under two heads, one covering the work due to minor design and construction modificatons on the part of the various manufacturers of equipment and embracing also minor changes of installation, while under the second head appears the cost of replacements and adjustments caused by the normal wear and tear and mishaps of the voyage. None of the items under the first head should recur on these vessels, nor in any new ships, nor in any later conversions, and their cost should be charged against capital account. The cost of the work under the second head has been counted as the true repair bill in the comparisons there made.

Thus against the voyages are charged the variable costs of fuel, oil, water, payroll, food, deck stores, engine stores, hull repairs and engine repairs. Port charges, tug charges and other incidentals of the voyage have been assumed as equal on the uniform basis to which the five different voyages have been brought, and the cost of drydocking and surveys can also be held to work out evenly for these vessels.



West Honaker, a McIntosh & Seymour engined motorship, in the Atlantic-Australian-Indian service of the Roosevelt S. S. Co.

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



Seminole, with Hooven Owens Rentschler engine, another motorship on the same service

On this basis the average savings per annum of the three motorships is at the rate of about $38,000 compared with the oil-burning steamer and $21,000 compared with the coal burner. These are direct savings in the cost of vessel operation, due to the conversion to Diesel power and take no account of the extra earnings of the motorvessels in carrying larger cargoes homeward from India.

They apply only to the present circumstances of operation and would vary one way and another under different circumstances of operation. For instance, the light outward loadings permit the motorships to bunker at Balboa for the entire voyage at a cost considerably lower than at any other port on their schedule, whereas when the ships get a full cargo outward from New York they would have to rebunker at an Eastern port, increasing their fuel bill. Similarly the oil-burning steamer fills her tanks at Balboa under present conditions of loading. On the other hand the coal-burning steamer which shows up so well in the comparison here would be at a constantly increasing disadvantage, because she needs her full bunker capacity on the long passage to Australia. Where the motorships have one full cargo outward and homeward, the extra profit from that alone will wipe out the entire year's advantage that the coal burner here shows over the oil-burner.

It is true also that the motorship economies are now at their minimum due to the low prices that have prevailed for fuel. When the prices go up, the motorship savings are augmented.

A further disadvantage is registered against the motorvessels in this comparison, because the savings are computed on a per annum basis, which means of course that the earning effect of the average higher speed of the motorships has not been credited. Inasmuch as they would average 2.36 uniform round-the-world voyages (26,000 miles, etc., as given above) against 2.21 such voyages averaged by the steamers, their average earning capacity is rendered about 7 per cent greater through that factor alone.

One could make a better showing for the motorship by taking as an example the vessel that shows the lowest cost per voyage. On the other hand, the showing would be worse if one took only the motorship with the highest cost per voyage. That is why the average of three vessels has been taken. It is representative. It gives a truer line on the merit of the conversion work of the Shipping Board as a whole. In any case the actual cost per voyage is not the real standard of value, because speed also has value, which is ignored in the comparison here made, solely because the freight earnings are purposely left out of account.

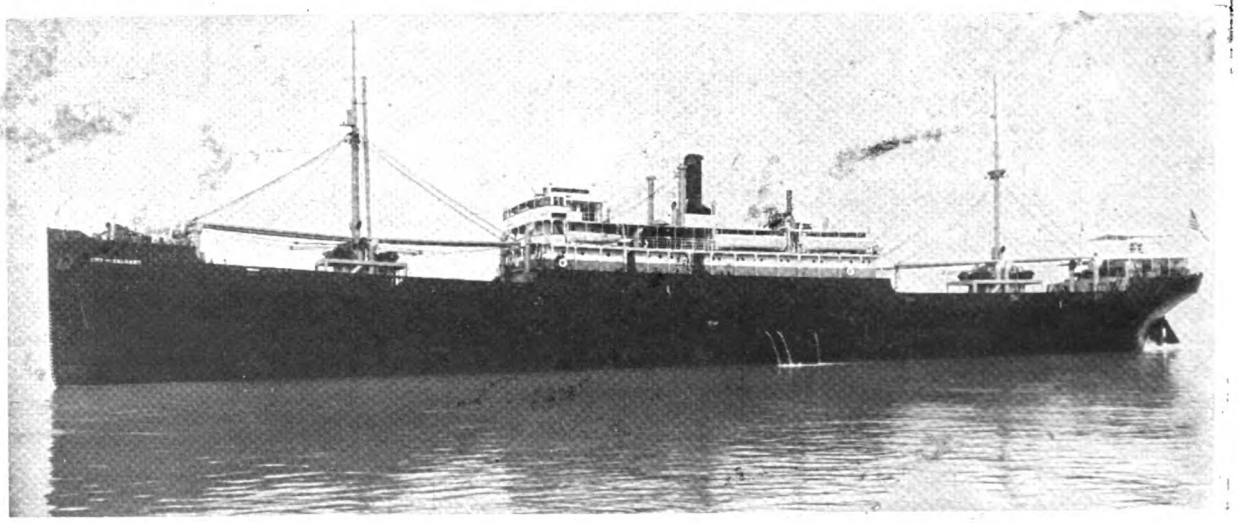
IN course of time with the development of the Australian and Indian trades, the annual advantage of the motorships—i.e. both savings in operating costs and extra earnings for freight—may climb to $60,000 per annum, in comparison with the steamers. At this rate the cost of conversion might be amortized in as short a period as 12 years.

There remains to be determined the capital cost of the Diesel conversions. I have always held that the total investment made in improvements to the converted vessels did not represent Diesel conversion cost. The average price of the Diesel conversions was around $600,000. The average total improvement price was over $800,000. The average difference included drydocking, repairs and outfitting for sea—which would have been greater if the vessel had been sent to sea as a steamer, because there would in that case have been machinery repairs also—; it covered an average of $135,000 for the betterments to the hull and accommodation—partly required for the conditions of the service which the vessels meet partly for passenger accommodation—and finally it embraced an average charge of about $30,000 for engineering inspection and general overhead—which are partly departmental and partly administrative.

The real cost of the Diesel conversion was the price of all the new machinery and of its installation, inclusive of structural alterations involved. This comprises the main engine and auxiliary generator sets, with their accessories, all engine room auxiliaries, electric winches, conversion of steering engine and of windlass, electrical apparatus throughout and donkey boiler, plus the complete installation thereof and including the hull alterations required thereby. All the rest of the work may be chargeable against the ship, but certainly not against the Diesel conversion, for the latter could just as well have been accomplished without the former. Repairs and outfitting must be taken care of out of freight earnings; improvements in cargo spaces, including tanks, are for the purpose of attracting freight; superior crew accommodation, rendered comfortable for tropical conditions, is an essential for securing good crews on these long voyages; passenger accommodation is to increase revenues.

The actual cost of converting CITY OF DALHART, SEMINOLE and WEST HONAKER to Diesel power averaged $590,750 for each vessel. How the average savings in the direct cost of operation of these three motorships provides for interest payments on these Government expenditures is seen in

(*Concluded on page* 590)



City of Dalhart, one of the Busch-Sulzer engined motorships, in the Roosevelt Line service

Generated on 2024-09-13 16:38 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Diesel Engine Industry Gathers at State College

Record Attendance Participates in Discussion of Problems Facing Marine and Stationary Industries

THE most successful, and representative Diesel power conference ever held in this country was convened at Pennsylvania State College on June 14, 15 and 16, under the auspices of the college and the Oil and Gas Power Division of the A.S.M.E. While the conference was primarily devoted to the use of the Diesel engines on land, a large number of marine executives were present and problems of marine operation were discussed by some of the speakers present. The National Trade Journals, Inc., was represented by five of its officials.

It is interesting to note that virtually every speaker referred to the great progress made by the marine Diesel as a basis for the discussion of the stationary applications of Diesel power—in fact the established supremacy of the Diesel engine at sea was a forceful and convincing motif that underlay the deliberations of the entire conference.

Facilities offered at State College for the various sessions and for the accommodations of visitors were very good, and the beauty of the college campus and surrounding territory provided a most unusual setting for the meeting; excellent weather aided materially.

The general impression of all concerned not only added great emphasis to the universal satisfaction expressed over the progress made at this meeting, but also especially stressed the fact that a Diesel power conference of this nature should be made an annual affair and should continue to be held at State College. In this connection great credit is due to Professor F. G. Hechler, who was the active driving force in all arrangements, and to Dean Sackett of the Penn State School of Engineering, who proved himself a genial and accomplished host. It might also be added that exceptional courtesy was extended to the lady visitors, accompanying their husbands, and who were most excellently entertained by the wives of the faculty members.

An interesting note of overseas interest in American developments was offered by George Heath, of Carels Diesel and Steam Engines, Limited, of London who addressed the banquet of the conference. Mr. Heath outlined his experiences on a 'round the world trip in the interests of his firm and counselled the American Diesel industry to continue its extension of the Diesel power with a full realization of the significantly important position of the Diesel engine today.

Facilities for exhibition of devices essential to the industry were provided in the new Penn State Mechanical Laboratory, and a number of prominent accessory manufacturers displayed their equipment. Among them were the Sharples Specialty Company, who showed the new small centrifuge described in another section of MOTORSHIP; the Morse Chain Company, displaying Morse chain drives suitable for engine camshaft and auxiliary drive, and for other marine drive applications; the Double Seal Piston Ring Company, offering a complete line of its well known Diesel engine piston rings and the Illinois Testing Laboratory, which have been very active in the manufacture of an exhaust-temperature pyrometer especially designed for Diesel engines, (A description of some new developments by this firm will be published in the near future).

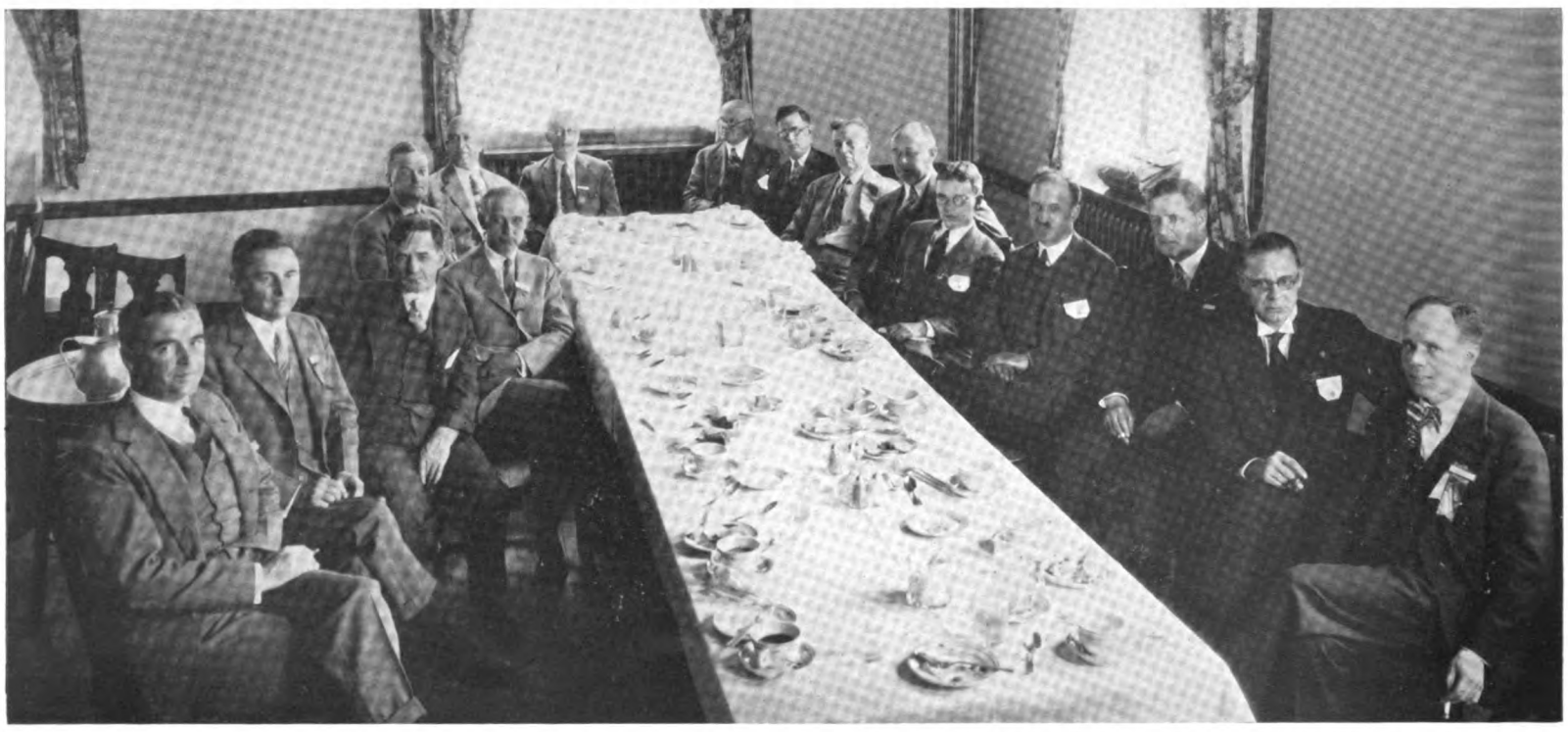
Air filter equipment for marine and stationary Diesel engines was exhibited by the Reed Air Filter Company; a working model of the peaning machine used in the manufacture of American Hammered Piston rings was displayed by the American Hammered Piston Ring Company, and samples of gasket products were shown by the Akron Metallic Gasket Company.

A Venn-Severin Oil engine was shown by the manufacturer, who has presented it to the Penn State Diesel Fuel Spray Laboratory; the Butler Mfg. Company exhibited a set of various sizes of Butler Bu-Nite steel-band nickel-alloy pistons, while exhaust pyrometer equipment was shown by the Brown Instrument Company. The McCord Radiator and Manufacturing Company made a pre-presentation to the engine-building fraternity of their new LD type glycerine type sight-feed lubricator for Diesel engine cylinders.

A complete line of Zenith Filters manufactured by the Zenith Detroit Corporation, manufacturers of carburetors and filters was on exhibition.

Oil Engine Power, a "National Trade Journal" had an exhibit.

Abstracts of the papers by the various speakers are printed on following pages.



The speakers at the Pennsylvania State College Oil Power Conference. From left to right: G. H. Michler, H. A. Pratt, L. H. Morrison, F. G. Hechler, W. A. Stetson, Dean R. L. Sackett, Edgar J. Kates, Fred R. Low, C. R. Alden, Harte Cooke, C. E. Beck, Roswell Ward, G. L. Wendt, Oliver F. Allen, George Heath, P. H. Schweitzer

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

DIESEL-FUEL-OIL SPECIFICATION

By G. H. MICHLER
Standard Oil Co. of New Jersey

The growing importance of the Diesel engine as an economical power unit cannot be overestimated. In one of its principal fields, the marine trade, its growing ascendency over steam power plants is attested to by Lloyd's marine-construction figures for the year 1927, which reported that for the first time in history world-wide construction of Diesel ship tonnage exceeded construction of steam tonnage.

It will be noted that in Europe where the construction of motor vessels is considerably more advanced at the present time than in this country, motorship construction during the year surpassed steamer construction by about 200,000 deadweight tons. When we consider that the fuel consumption in these large units bears a ratio of 1:3 as compared to fuel oil burned by steamers under boilers to develop the same horsepower in comparable tonnage, the importance of the Diesel engine as a factor in conserving the future world oil supply can be appreciated. Its advantage to the operator, particularly of freight ships, on long trade routes, is decided.

Everything apparently justifies the operators' investment in a comparatively high-priced piece of mechanism but there is, as usual, a fly in the ointment. In this case it is the various types of Diesel oil required by different engine builders, and passed on by them to operators as a basis of performance guarantees.

Let me cite some examples: A couple of years ago a motorship made her maiden voyage from a United Kingdom port to the United States. Our knowledge of requirements of marine Diesel engines led us to believe that the oil furnished by us was very much superior to that furnished on the other side, and we believe that most Diesel engine manufacturers would be of the same opinion. This is apparently borne out by the specifications issued by marine Diesel engine builders from time to time.

In actual operation of the vessel, however, serious trouble was encountered, and all of the trouble was laid to the oil by operators of the motorship. As an experiment, we mixed 40 percent of a heavy residue oil with Diesel oil, which had the result of reducing the gravity, increasing the viscosity, sulphur content, and coke residue, and very materially increasing the asphalt content by what is known as the Italian tar test, also reducing the B.t.u. per lb. In other words, the oil was brought to what we consider a poorer quality and made to conform more nearly to the grade of oil delivered in the United Kingdom, which appeared to operate successfully. The operators claimed that by blending what we considered an inferior oil, their troubles were overcome. This is only one illustration of the difficulties we have encountered.

In a great many cases the exacting specifications now required cannot be met, or if they can be met the oil can only be delivered from refining centers, as the specifications demand running a special batch of oil, carrying it in separate tankage, and delivering through clean lines or barges so that the oil will not become contaminated with what has heretofore been considered a standard grade of Diesel oil.

We do not believe that consideration has been given to the fact that it is impossible to carry several grades of oil at distributing points which are not refining centers. If the oil industry attempted to do this it would have to invest millions of dollars in increased tankage in order to carry separate grades of oil at different points where there might only be a demand for the special grade required once a year. It will be readily seen that this does not fit in with refinery operations, nor does it fit in with tank-steamer deliveries. It is of course impractical to carry several different grades of Diesel oil on a tanker making delivery from a refinery point to an oil-distributing station.

We feel that Diesel engine manufacturers overlook the fact that crude petroleum is produced in a great many sections of the world. All of these crudes vary in their characteristics. In the United States foreign crudes will be received from Peru, Mexico, Colombia, Venezuela, Trinidad, or the Argentine, and in addition to these foreign crudes Atlantic Coast refineries may be receiving crudes from Pennsylvania, Illinois, Kansas, Arkansas, Oklahoma, Wyoming, Texas or California. Some are primarily asphaltic-base crudes, some naphthene- and some paraffine-base, and all vary in their other characteristics. Furthermore there may be some variance in crudes from different sections of these various producing divisions.

Consider for a minute the operation of an oil refinery on the Atlantic seaboard. It will receive daily by pipe line and tank steamers crudes of widely varying characteristics from different parts of this country or imported from other countries. The problem is to extract from these crudes various grades of finished products, aviation naphtha, gasoline, lubricating oils, greases, wax, kerosene, gas oil, Diesel fuel oil, light fuel oil for metallurgical work, bunker C fuel oil and asphalt, not to mention a large assortment of specialties. You can readily appreciate the number of stills, lines and tanks required to handle such a volume of products from different kinds of crude oil. Let us go further still and imagine the result of a dozen or more of different sets of specifications being required for each one of the long list of finished products—the result is obvious. It means multiplying refinery equipment and expense to a point beyond all reason. The cost of finished products must compensate for the unreasonable extension of equipment. It is perfectly true that there are a great number of different grades of lubricating oil, which is of necessity a highly specialized product, but you do not buy lubricating oil at a Diesel fuel oil price.

It is therefore clear that there must be considerable latitude in drawing up Diesel-oil specifications. An exacting specification drawn up to meet a Diesel-engine fuel oil that might be made from Mid-Continent crudes would quite likely not be met with Diesel-engine fuel oil produced from California, Venezuela, Mexico or Texas crudes, nor could such a specification be met by refiners who are running a great number of mixed crudes. In other words, if an attempt is made to segregate crudes to produce Diesel oil only from a selected crude, the cost of the product would be high.

From the standpoint of the oil companies the question of specifications is considerably simplified if they are limited to three: minimum gravity, sulphur content and flash. With regard to the first; it is our feeling that a minimum gravity of 24 deg. A. P. I. should be generally satisfactory. We believe that a maximum sulphur content of 1.5 per cent should be acceptable. Minimum flash of 150 deg. closed cup has always been the standard.

I know you are all interested in the advancement of the Diesel engine. I am sure you agree that that advancement depends upon a suitable future supply of Diesel-engine oil at a reasonable price. I am equally sure that you have not been in a position to realize the fact that varied and restrictive specifications present a formidable obstacle to low-priced Diesel oil. I have endeavored in what I have said to show you that that is the case. The more liberal the specifications of oil demanded for Diesel engines, the greater the security of an adequate supply of fuel oil for them at a reasonable price in the future.

SPECIALIZATION IN MANUFACTURING DIESEL ENGINES

By OTIS D. TREIBER
President, Treiber Diesel Engine Corp., Camden, N. J.

A manufacturer is always hunting ways to cut costs and the purchase of finished specialty products is perhaps one of the principal ways to do this. The automotive industry could not have developed to its present state without the ability of manufacturers to buy specialty finished products.

The Diesel engine industry has today a very good supply of specialty products to draw from such as bearings, piston rings, drop forgings, castings, crankshafts, valves, cams, springs, pistons, gears, governors, lubricators, pumps, gauges and valves, all of which are more or less common to many builders of engines.

The Diesel engine business is settling down to a more stable and well organized business. The ability to obtain specialty products from various shops will undoubtedly have a tremendous bearing on the reduction of Diesel engine costs and should be encouraged. There will undoubtedly be different designs of items such as fuel oil pumps and spray nozzles. However, these generally fit about the same tools, and shops should organize themselves for producing such things, even in small quantities.

The various parts of the Diesel engine can be classified into a reasonable number of groups such as parts which are hardened and ground, parts made on screw machines, automatics, parts made from large forgings such as crankshafts and connecting rods, parts made from small iron castings, parts made from large cast iron castings, parts made from aluminum. Another item is piston rings; still another is bearing shells. Another separate classification could be cylinder heads and liners. Under these classifications can be grouped practically all the parts entering into the construction of Diesel engines. It is necessary for the specialty manufacturer to study the needs of the engine builder.

Take, for instance, the matter of spray nozzles. There are probably twenty-five different kinds of spray nozzles today built in as many different shops. Probably there is not sufficient production in any one shop to tool up for high production. However, should the construction of all of these spray nozzles be confined to one shop and to one organization, there are a great many of the operations such as heat treating and grinding, assembling, testing, etc., that could be done much more economically resulting in larger savings to the ultimate purchaser.

EUROPEAN DIESEL ENGINE DEVELOPMENTS

By OLIVER F. ALLEN
International General Electric Co.

The growth of oil engine manufacture has been so vast in Great Britain and on the Continent that I cannot possibly include reference to many important and interesting developments. I only have time to mention a few manufacturers and their products. I have tried to select those which are typical.

Before the World War interchange of engineering data and grouping of manufacturing interests in order to give to the public the best possible product, to the workman steady employment at fair wages and to each market, all over the world, the product at the lowest prices consistent with these requirements was unusual. It is now common practice and is being profitably applied in oil engine manufacture by several important international groups. Not only is this growth of engineer-

Generated on 2024-09-13 16:33 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

ing cooperation among the nationals of the leading powers accelerating improvements and reducing costs to the ultimate user, but the personal contacts involved are a mighty powerful influence towards the World Peace we are all so sincerely hoping for.

The greatest expansion of the industry has been in marine propulsion. This year there was 1,333,875 i.hp. of marine Diesel engines building. This is about 100,000 i.hp. more than at the end of 1927. For over a year now both gross tonnage and horsepower of motor ships under construction has continuously exceeded the total of reciprocating and turbine steam ships combined.

The airless injection type is practically a development of the last five years and seems to have been initiated in England, although so many engineers were working on the problem in several countries directly after the war that it is perhaps unfair to give any one group special credit. It was well established in engines up to about 750 b.hp. some four years ago and is now employed in engines up to 11,700 b.hp. and proposed for some up to 15,000 b.hp.

Injection pressures vary from 1000 to 5000 lbs. per square inch. Some manufacturers as, for instance, Deutz and M. A. N. use individual pumps for each cylinder but with different pressures. Fuston of England has recently changed to a single pump and a distributor, although of a different type from that employed by the Carels-Ingersoll-Rand Group. Hesselman-AEG. use individual pumps with suction valve control. Others use a single pump with a high pressure manifold and control by timing the opening of the injection valves. It is too early in this development to tell which combinations will survive but more accurate timing and quick, positive cut off of the injection oil stream combined with improved spraying action during injection seems to be the direction in which research is tending.

I will not attempt to trace the history of supercharging research and development beyond stating that Mr. Buchi and others have been working at it for about 25 years and that it attracted attention in connection with high altitude flying over ten years ago and began to be generally studied about five years ago. An important European accomplishment is that of Dr. Alfred Buchi, of Winterthur, Switzerland. After several years of research, the Buchi syndicate has been formed and that system is now being used by Duetz in Germany, Werkspoor in Holland, Tosi in Italy, and the Swiss-Locomotive & Machine Works in Switzerland, under long term license agreements and by M. A. N., Harland and Wolff and others for specific jobs. Up to the 1st of January this year 37 engines had been built or were building employing this system. With the exception of five engines ranging from 450 to 750 h.p., these are all of from 1200 to 4000 hp. and are for direct drive ship propulsion and stationary power plant service.

One of the first large double-acting engines was the product of the combination of Werkspoor of Holland and the North Eastern Marine Engineering Co. of Wallsend on Tyne. It was a four-stroke cycle engine, single-cylinder 800 mm. (31½ in.) x 1400 mm. (55 in.), 95 r.p.m., 750 hp., tested early in 1924.

Burmeister & Wain are perhaps the outstanding exponents of four-stroke cycle, double-acting Diesel engines. Their engines of this type are so large, so numerous and so well known that I will not describe them. Both of these designs are being built by many manufacturers.

The first successful European two-cycle double-acting engine I saw was the single-cylinder M. A. N. engine at Augsburg in November, 1924. As a result of its success, the largest Diesel in the world was built from M. A. N. designs by Blohm & Voss at Hamburg.

Director Dr. Bannwart of the Hamburg Electric Power System recently said of this unit:

"Since the set was put in service early in September, 1926, we have not yet experienced the least trouble as the motor runs very well and has proven its value."

The large double-acting engines are being built with both direct-connected reciprocating-scavenging air pumps and with electric motor driven turbo-blowers. It is too early in this development to predict the field in which each type will survive.

The United States has taken the lead in the introduction of electric drive for ship propulsion. With Diesel engines this has been applied to tug boats, ferry boats, yachts and tankers, but has not been introduced in Europe as extensively as here.

Another instance of the effect of American developments on European practice is the equipment of the motor tanker BRUNSWICK being built by Scotts for the Atlantic Refining Company. The propelling machinery which is now being installed, will consist of four six-cylinder, 750 b.hp. Carels-Ingersoll-Rand engines direct connected to a continuous current generator. The vessel will have a single-screw, electric motor driven. This is the largest Diesel-electric equipment so far produced abroad and is also another example of international cooperation, as the hull is built in Scotland, the electrical machinery by the British Thomson-Houston Company, affiliated with the General Electric Company of the United States, and the oil engines were built by the Carels Works in Belgium from designs supplied by the Ingersoll-Rand Company.

Very little reference has been made to fuel economy, chiefly because the improvements in fuel consumption are not of great magnitude and are of minor importance compared with the design problems. I will, however, give one example of what a motorship is doing.

James Smith, Superintending Engineer, of the Union Steamship Co., of New Zealand, when passing through this country on his way to England a few weeks ago allowed me to copy some data from his personal log book and has authorized me to give it to you. It is, therefore, first-hand, accurate information secured from the owners. This data refers to the AORANGI, built by Fairfield in Glasgow, and has four two-cycle, six-cylinder, 3000 to 3600 b.hp. Sulzer Bros. engines. The AORANGI had made over 300,000 miles in the Pacific service. Up to the end of 1927, when the engines were first overhauled, its performance had been as follows: (Figures refer to English long tons and Imperial Gallons.)

Total distance, voyages—201,043 nautical miles
Average speed—16.44 knots
Total fuel, propelling—23,359 tons
Other purposes—4,891 tons
In port—2,605 tons
Engine hours—12,224
Average i.hp. propelling—14,710
Average fuel per day propelling—45.8 tons
Other purposes—9 tons
Average fuel per i.hp.—0.29 lbs.
Total lubricating and cylinder oil first year—41,749 gals.
Total lubricating and cylinder oil second year—28,542 gals.
In port first year—2,652 gals.
In port second year—1,550 gals.
Per day first voyage—294 gals.
Average last four voyages—110 gals.
Average speed three best voyages—
17.0 knots
16.96 knots
16.88 knots
Highest daily speed.....18.1 knots

Now, after going about 300,000 miles, the fuel per i.hp. on the voyage of December, 1927, was 0.311 lbs. and for January, 1928, 0.315 lbs.

Mr. Smith showed me the log of fuel consumption for a large number of voyages and it is amazing how little variation there is in the amount of fuel per voyage. The systematic and regular way in which this ship behaves in the matter of reliability, low maintenance and uniform economy of fuel and lubricating oil is certainly a strong argument in favor of Diesel propulsion.

CO-OPERATIVE DIESEL ENGINE RESEARCH

By HARTE COOK
McIntosh & Seymour Corp.,
Auburn, N. Y.

The Diesel engine as it stands today has reached practically the same state of development as other power equipment such as the steam engine and the turbine. The main problems have all been solved, and efficient reliable service has been demonstrated in a great many lines of use.

While the main problems have all been solved, an advance could be made if more complete information could be obtained in regard to some of the fundamental things connected with the operation of a Diesel engine,—such as more complete knowledge of the nature of the combustion, the characteristics of the products of combustion, the high temperatures and pressures obtaining in a Diesel engine; the characteristics and nature of the ignition of fuel at these high temperatures and pressures, more complete information in regard to the transfer of heat from this mixture to the walls; a co-ordination of the information now existing in regard to the transfer of heat through the walls to the water jackets; a more complete knowledge of the desirable characteristics of the walls and other parts that are exposed to the high temperatures so as to resist not only the temperatures, but also the natural wear.

These problems of the Diesel engine are along a good deal the same lines as has been the case from the first,—the most important one being the combustion characteristics of the engine, which with the design of the engine, especially the parts in connection with the combustion space, and also the materials used for this part of the engine, have an important bearing on the size and output limitations.

These three things also have a bearing on the maintenance of a Diesel engine, and the maintenance further depends on the lubrication, and the cooling, and the nature of the cooling water used.

For special cases such as for railway work, the output limitations will require special investigation, and also the question of weight will have to be carefully gone into.

In regard to the special uses for aeronautics, the weight of the Diesel engine is a vital factor in this case, and the output limitations will have to be especially investigated, to secure the light weight desired, and as high speeds will have to be used, special investigation will have to be made of the characteristics of the fuel consumption at these high speeds.

In regard to the solution of these problems, research in various degrees is now being carried out by industrial concerns and government departments.

For instance, in regard to the aeronautical use of the Diesel engine, the National Advisory Committee for Aeronautics has conducted very interesting and complete tests on the output limitations, fuel consumption and weights of the Diesel engines for this use.

It is when Diesel engines are in actual service and being operated by the user, that the problems which have to be solved are developed.

Generated on 2024-09-13 16:32 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The transfer of heat from gaseous mixtures to the walls of the Diesel engine involve a careful investigation of the problem of heat transfer, which would be of advantage not only to Diesel engine builders, but to builders of steam locomotives, boilers, radiators, which are used in the heating of buildings, and to the builders of radiators for cooling automobiles.

In view of the co-operation of a number of industries in supplying materials which go to make up a modern Diesel engine, it would be desirable for these industries to co-operate, and also for the Diesel engine builders themselves to co-operate, and also the various other industries who would be benefited by special research on problems specifically brought up by the manufacturer of Diesel engines, in the solution of such problems as may appear.

Just how this research should be conducted or supported is a question that should be taken up, and settled to insure the quickest and best development of the Diesel engine.

It is only the largest concerns that can afford to carry on such research as is now desired, and in this country government agencies cannot be expected to solve all the problems of industry, nor would this be entirely desirable. It would seem that the best solution of this problem of Diesel engine research would be for industry as a whole to co-operate in supporting such research as is desired. In the writer's opinion this research could best be conducted and directed by such a disinterested body as the American Society of Mechanical Engineers.

MANUFACTURE OF DIESEL FUEL INJECTORS

By C. R. ALDEN

Chief Engineer, Ex-Cel-O Tool Mfg. Co.

The difficulty in meeting the fuel-injection requirements of the modern high-speed oil engine is ever before the Diesel-engine designer. The need for extreme accuracy in certain parts of the fuel-injection system is keenly realized when it is considered that a four-cylinder four-cycle oil engine rated at 50 hp. at 1200 r.p.m. and consuming 0.5 lb. of fuel per horsepower-hour under full load will require the injection of but 0.00017 lb. of fuel per impulse. This corresponds to approximately 0.0055 cu. in. or 0.0327 cc. The time allowed for completing the injection of this amount of fuel is frequently not more than $^1/_{240}$ of one second. An error in metering of 0.000017 ll. per impulse will cause one cylinder to carry 10 per cent over or under its proper share of the load.

When flexibility of engine performance is considered it is realized that with the engine idling, the indicated brake horsepower would probably not exceed 5 for which the normal fuel charge per impulse would be about 0.000017 lb. and from which a variation of 0.0000017 would represent an error of 10 per cent.

It is readily appreciated that when such exactitude is maintained throughout the entire range of engine performance the problems of the Diesel-engine designer are at least paralleled by those of the artisan who must produce the fuel-injection system.

In a number of respects it is the author's opinion that designer and builder have been slow to cooperate to their maximum advantage. For example, the author remembers seeing a fuel pump of European design in which four plungers were to be fitted and lapped into four holes in the fuel-pump block as were also the suction and discharge check valves and bypass valves. An accident to one of these fitted holes would therefore mean either scrapping of the entire block or the fitting of an oversize plunger or valve. To make such a block of hardened material would be an economic if not a mechanical impossibility, as would also the making of such a block of stainless or corrosion-resisting material. All three requirements, interchangeable precision parts, sufficient hardness, and resistance to corrosion, are vital to the successful manufacture and marketing of oil engines under conditions now existing in the United States.

In another instance an American manufacturer requested a quotation on lapped valve stems of ⅜ in. diameter, and, in order to make a tight fit against the pressure employed, specified a lapped bushing 6½ in. in length. Such an instance would not be cited except that it is typical of Diesel designers to specify a length of lapped fit which is longer and more expensive than is required to secure perfect tightness. This makes the parts more expensive to manufacture than is necessary. Frequently the excessive length of the fitted parts defeats its very purpose through inability to make both hole and plunger perfectly straight and necessitating a poor fit in order to obtain a free motion of the parts.

Little is known of the length of lapped or fitted telescoped concentric cylinders required to prevent hydraulic leakage while allowing axial mechanical motion and the variation of this length with the diameter of the plunger or stem; nor of the variation of this length with the pressure under which the parts are to be operated and the variation of length with the grade of fuel to be handled. Investigation should be made of the precision of fit required under the varying conditions outlined above.

An analysis of any number of fuel-injection pumps will show that they consist essentially of certain plungers and bushings, bypass valves, check valves and other precision parts on which the proper functioning of the pumps depends. It is true that the mechanism for operating these parts, the form of the principal parts in which the precision details are mounted, the location and method of driving the pump, etc., will probably always differ widely, as long as oil-engine designers retain their individualities. However, there is hardly an oil engine built today which, by the making of certain very simple changes, would not permit the application of standard precision details of the kind which have been under consideration in this paper.

Were these details so standardized, the combined volume of the precision details required as the number of oil engines manufactured continues to increase would uncover a sufficient volume of business to be of interest to manufacturers who are suitably equipped for economically manufacturing these specialties. The resulting competition should insure the Diesel-engine manufacturers of a higher grade of fuel-pump parts at a much lower cost.

THE DIESEL ENGINE AND THE PUBLIC UTILITIES

By ROSWELL H. WARD

Managing-Editor of MOTORSHIP

The problem of the relationship between the Diesel engine industry and the public utilities is one which deserves the careful consideration and dispassionate scrutiny of all concerned.

It is a matter of vital importance to the utility companies because the Diesel engine, in its present advanced state of development, is likely to be the most direct answer to the future challenge of low power rates, high transmission costs, and high fuel costs—conditions which every power producer is facing or must expect to face within the next few years. Given proper appreciation of scope and capabilities, the Diesel engine can become an important force in extending the field of usefulness and the public understanding of the Diesel engine.

The Diesel engine industry and the public utilities are both comparatively young—and they are both "pioneer" industries in spite of the tremendous development which has taken place within the past few years. I stress this "pioneer" element because even a cursory glance into the future shows that we have only "scratched the surface" as far as the possible extension of electric energy is concerned. At times the two have lived and worked together with the utmost harmony; at other times they have indulged in the most vituperative family squabbles.

The Diesel engine industry has, if anything, been a little bit over-enthusiastic in some of its relations with the utility companies, a perfectly natural reaction when they find great and supposedly progressive power producers apparently blinding themselves to the immense progress in European Diesel central stations.

In an effort to clarify the sales methods of both industries, the author has carried his inquiries not only to Diesel executives and through the courtesy of Paul S. Clapp, managing director of the National Electric Light Association, he has also been given an excellent opportunity to hear what the utility power salesmen have to say about it.

From the standpoint of the Diesel engine salesmen the following practices of public utility power salesmen seem to be the ones which arouse the most comment:

1. Inaccurate compilation of reports on Diesel power costs which are submitted as a basis for comparison with the utility companies' quotation.
2. Misrepresentation of operation of Diesel engines in utility company plants and in private installations.
3. Misleading statements as to future supply of fuel oil; criticism of Diesel engine manufacturer's advertising; presentation of contracts which do not clearly indicate the extent of charges, due to penalties, demand charges, etc.
4. Exaggerated statements as to the degree of training necessary for a successful oil-engine operating engineer.
5. Misrepresentation of municipal and insurance company regulations for storage of fuel and lubricating oil.

The public utility men, in turn, sum up their composite criticism of Diesel sales methods as follows:

1. Criticism of public utilities as "soulless" corporations for monopolies, criticism of public utility policies, rate structure.
2. Criticisms based on differences in industrial and residence rates, etc., etc.
3. Appeals for public ownership of municipal plants based on everything from costs to civic pride, extremely broad generalizations as to superiority of Diesel power.

The question of Diesel operating statistics has been mentioned—it is comparatively easy to get cost reports on private Diesel plants, although they are lacking in uniformity. But, the very same utility group that will criticise the Diesel engineer for lack of mass of uniform statistical data will be the first to refuse to release the cost data on its own Diesel plants. Yet statistics are the basis of any impartial engineering survey.

A future development may be the extensive use of Diesel engines by utility companies themselves, who find it uneconomical to attempt to transmit power over the high line to an isolated industrial user.

Public utility use of the Diesel engine is dependent on an appreciation of Diesel power which will be fostered by "cleaning up" the methods of competition for industrial load; by taking additional steps to inform graduate engineers as to the recent progress in Diesel engine design and application; by co-operating with the technical schools to bring their power plant courses up to a requisite point of "Diesel consciousness" and by gathering and disseminating broader and more authoritative cost records of large Diesel plants.

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The question of competition for municipal plants is largely a matter of the individual policy of the Diesel engine manufacturers and public utilities concerned. Progress along the lines indicated will largely eliminate the urge of "unhealthy" methods in this market.

It will thus be seen that what appears at times to be an intricate and embarrassing conflict between two great industries, is largely a series of minor misunderstandings to which a number of very logical answers immediately suggest themselves. Above all, there is the essential dedication of these two industries to a common cause—the dissemination of the emancipating life blood of cheap and reliable electric energy to the mass of the world's population—a tremendous and fundamental work which promises to be the greatest civilizing force ever conceived by man.

THE ECONOMIC FIELD FOR LARGE DIESEL ENGINES

By EDWARD B. POLLISTER,
General Manager, Busch-Sulzer Bros.—Diesel Engine Co.

Although the desired 3750 b.hp. engines required for the Panama Canal power station was larger than any Diesel which had at that time been built in the United States, it is astonishing that no less than eight substantial American heavy-machinery firms considered the large Diesel engine field sufficiently attractive to justify bidding on, an undertaking which for many involved a development expense of several hundred thousand dollars. All now have marine Diesel engines of 2500 b.hp. or larger in service.

A proper question may be "What is a 'large' Diesel regine?" Diesels built by Sulzer Brothers, of Winterthur, Switzerland, of 4000 hp. capacity have been operating in European land stations for over fifteen years. In the same year that the Panama Canal invited bids on 3750 hp. Diesel engines, the Hamburg Electric Company, of Hamburg, Germany, placed an order for a 15,000 hp. two-cycle double-acting M. A. N. Diesel generating unit for installation in their electric generating station to carry peak loads. While this is the largest Diesel now in operation, Sulzer Brothers have developed a single-cylinder experimental double-acting two-cycle engine rated for stationary work at 2400 b.hp. at 110 r.p.m. with a cylinder bore of 900 mm. and a pistcn stroke of 1400 mm. A 10-cylinder engine of this size would develop 25,000 b.hp. This number of cylinders is frequently employed in marine work, and Sulzer Brothers have supplied eight 10-cylinder units averaging above 5000 hp. each for propelling ships. As 900 mm. diameter of cylinder is not the limiting size, a former Sulzer single-cylinder experimental engine having a bore of 1000 mm., somewhat larger units are not without the range of conservatism. A large Diesel may therefore be considered as of from 2500 to 25,000 b.hp.

In considering the economic field for large Diesel engines in this country, it is important to note that the successful performance of large marine Diesels was a vital feature in the decision to go ahead with the 12,000 hp. Panama Canal power plant; and the extremely rapid adoption of the Diesel for the propulsion of ships has eliminated what might be the feat of experimental development by possible purchasers of large land Diesels. The largest motorship in service, the AUGUSTUS, of 32,500 gross tons, is propelled by Diesel totalling 28,000 hp. The proposed reconditioning of the Shipping Board steamer MOUNT VERNON calls for two propelling Diesels of 14,500 b.hp. each, and a total Diesel plant of 35,000 to 40,000 b.hp. These large engines can be furnished in the same American-built cylinder sizes as are now successfully operating in round-the-world maine service. The following survey as of December 31, 1927, of marine engines under construction throughout the world discloses that the aggregate horsepower of Diesel engines building or being installed is over three times that of steam turbines (excluding Germany—figures not availible), and that the tonnage of motorships now building is greater than that of steamships.

Steam Engines
Reciprocating

No.	I.hp
327	556,874
Average size	1,700

Turbine

No.	I.hp
34	343,700
Average size	10,000

Oil Engines

No.	I.hp.
352	1,233,956
Average size	3,500

Total gross tonnage under construction

Steam	1,494,532
Diesel	1,609,888

The trend toward Diesels is indicated by a statement issued in April of this year by Lloyd's Register of Shipping for the first quarter of 1928, showing a gain to March 31, 1928, of oil engines to 1,333,875 i.hp. compared with a decline of steam turbines (excluding Germany) to 277,600 i.hp., and a decline of steam one for marine Diesels as compared with steam turbines demand the serious attention of designers of land power plants.

DELEGATES TO THE FIRST NATIONAL OIL & GAS POWER MEETING

State College, Pa.

June 14, 15 and 16, 1928

Adams, R. H.—Musa-Hartzell-Ducasse, Inc., New York, N. Y.
Alden, C. R.—Ex-Cell-O Tool & Manufacturing Co., Detroit, Mich.
Allen, C. L.—Penn State College, State College, Pa.
Allen, O. F.—International General Electric Co., Schenectady, N. Y.
Anderson, J. W.—De LaVergne Machine Co., New York, N. Y.
Anderson, R. M.—Stephens Institute, Hoboken, N. J.
Axford, Hubert—Ingersoll-Rand Co., Scranton, Pa.
Bailey, L. L.—Pittsburgh, Pa.
Barrett, C. G.—Nordberg Manufacturing Co., Milwaukee, Wis.
Bateman, G. F.—Cooper Union, New York, N. Y.
Beck, C. E.—Busch-Sulzer Brothers Diesel Engine Co., St. Louis, Mo.
Beese, C. W.—Penn State College, State College, Pa.
Billoque H.—Musa-Hartzell-Ducasse, Inc., New York City.
Bissell, S. L.—Standard Oil Company, Cleveland, O.
Bjorenson, Carl S.—Clark Brothers, Olean, N. Y.
Blair, C S.—Henry L. Doherty Co., New York City.
Bloomsburg, M. S.—Standard Oil Co. of New Jersey.
Bock, G. E.—H. L. Doherty & Company, New York, N. Y.
Bohnsack, Henry—International Steel & Iron Works, Evansville, Ind.
Bothwell, E. J.—International Nickel Company, New York, N. Y.
Bowman, P. B.—The Texas Co., Corapolis, Pa.
Boyer, R. L.—C. & G. Cooper Co., Mt. Vernon, O.
Bradford, L. J.—Penn State College, State College, Pa.
Brelsford, H. E.—Worthington Pump & Machinery Co., Buffalo, N. Y.
Bressler, R. D.—Power Manufacturing Co., Marion, O.
Briggs, H. E.—Anderson Engine & Foundry Co., Anderson, Ind.
Brooks, F. T.—Norristown, Pa.
Brooks, George W.—Penna. Power & Light Co., Allentown, Pa.
Broshek, J. J. (Commander U. S. N.); Navy Yard, Philadelphia, Pa.
Browne, Joseph E.—National Trade Journals, Inc., New York, N. Y.
Buker, H. W.—New York, N. Y.
Bullinger, C. E.—Penn State College, State College, Pa.
Burger, L. F.—Riverside, Ill.
Butler, W. H.—Standard Oil Company of N. J., New York, N. Y.
Cairoli, C. S.—Western Electric Co., New York, N. Y.
Carlton, Lee C.—Bosch Magneto Co., Chicago, Ill.
Cassidy, P. F.—Tidewater Oil Co., New York, N. Y.
Christie, G. R.—Standard Oil Co. of New York.
Church, E. F.—Polytechnic Institute, Brooklyn, N. Y.
Clark, Paul—Clark Brothers, Olean, N. Y.
Clary, C. L.—Elliott Company, Ridgway, Pa.
Cochran, C. C.—Penn State College, State College, Pa.
Codrington, G. W.—Winton Engine Works, Cleveland, Ohio.
Cole, Maxwell—Philadelphia Electric Co., Norristown, Pa.
Cook, D. D. & Wife—Double-Seal Piston Ring Co., Chicago, Ill.
Cooke, Harte & Wife—McIntosh & Seymour Corporation, Auburn, N. Y.
Cooper, H. D.—Pittsburgh, Pa.
Cox, C. E.—Chicago Pneumatic Tool Co., Franklin, Pa.
Craig, A. B.—Power Manufacturing Co., Marion, O.
Crandall, N. I.—George Washington University, Washington, D. C.
Crossen, E. H.—Chicago Pneumatic Tool Co., Franklin, Pa.
Cruickshank, D. C.—George Washington University, Washington, D. C.
Curyell, F.—De La Vergne Machine Co., New York, N. Y.
Czock, J. H. & Wife—Worthington Pump & Machinery Corp., Buffalo, N. Y.
De Juhasz, K. J.—Penn State College, State College, Pa.
Dent, J. A.—University of Pittsburgh, Pittsburgh, Pa.
Doelling, H. A.—De La Vergne Machine Co., New York, N. Y.
Doelling, L. K.—De La Vergne Machine Co., New York, N. Y.
Dotten, William—The Texas Co., Philadelphia, Pa.
Doyle, F. B.—Ingersoll-Rand Co., New York, N. Y.
Doyle, W. L. H. & Wife—Ingersoll-Rand Co., New Rochelle, N. Y.
Everett, H. A.—Penn State College, State College, Pa.
Felizardo, Manuel I.—Bureau of Public Works, Ithaca, N. Y.
Fellows, R. D.—Penn State College, State College, Pa.
France, A. W.—France Packing Co., Tacony, Pa.
Frauenfelder, J. B. & Wife—Sun Ship Bldg. & Dry Dock Co., Chester, Pa.
Gaum, C. G.—Penn State College, State College, Pa.
Gay, F. W.—De La Vergne Machine Co., New York, N. Y.
Gehres, H. A. & Wife & Son—C. & G. Cooper Co., Mt. Vernon, O.
Gregory, W. K.—Reed Air Filter Co., Louisville, Ky.
Grieshaber, E.—Nordberg Manufacturing Co., Milwaukee, Wis.
Gilmore, M. D.—U. S. Navy Department, Brooklyn, N. Y.
Groff, J. C.—Bethlehem Steel Co., Allentown, Pa.
Guillett, G. L.—Penn State College, State College, Pa.
Hahn, Professor C. V. & Wife—Drexel Institute, Philadelphia, Pa.
Hall, N. B.—Commander, U. S. Coast Guard Service, Chevy Chase, Md.
Hamel, J. B.—Ardsley, Pa.
Hamill, F. L.—Zenith Detroit Corp., Detroit, Mich.
Haskell, R. & Wife & Son—The Texas Co., New York, N. Y.
Heath, George—Carels Diesel & Steam Engs., Ltd., London, England.
Hechler, F. G., Professor E. G.—Penn State College, State College, Pa.
Heiner, J. H.—U. S. Navy Yard, Boston, Mass.
Hench, N. F.—Atlantic Refining Co., Primos, Pa.
Henszey, J. W.—State College, Pa.
Herod, W. R.—General Electric Co., Schenectady, N. Y.
Hill, E.—McGraw-Hill Publishing Co., New York, N. Y.
Hoffman, L. F.—Chicago Pneumatic Tool Co., Franklin, Pa.
Hoffman, Max—Waukesha Motor Co., Waukesha, Wis.
Hunter, B. F.—Gulf Refining Co., Pittsburgh, Pa.
Huntsberger, R. C.—American Rolling Mill Co., Ashland, Ky.
Inman, E. R.—Patent Attorney, Franklin, Pa.
Inderdohnen, J. F., The Bristol Co., Philadelphia, Pa.
Irwin, Neal—Chicago Pneumatic Tool Co., Oil City, Pa.
Jacklin, H. M.—Purdue University, Lafayette, Ind.
Jackson, P. B.—Aluminum Co. of America, Pittsburgh, Pa.
Joachim, W. F.—National Advisory Committee for Aeronautics, Langley Field, Va.
Johnson, A. F.—George Washington University, Washington, D. C.
Kasley, A. T.—Westinghouse Electric & Mfg. Co., Moore, Pa.
Kates, E. J. & Wife—203 W. 13th Street, New York, N. Y.
Keller, J. O.—Penn State College, State College, Pa.
Kirn, Robert—C. Lee Cook Mfg. Co., Louisville, Ky.
Kuttner, Julius—Editor, Oil Engine Power.
Krieg, E. H.—Electric Bond & Share Co., New York, N. Y.
Lahl, W. F.—The Crane Co., Chicago, Ill.
Lamb, Lawton B.—National Trade Journals, Inc., Cleveland, O.
Lemp, Herman & Wife—Ingersoll-Rand Co., New York, N. Y.
Lewis, G. W.—National Advisory Committee for Aeronautics, Washington, D. C.
Light, J. J.—Penn State College, State College, Pa.

Generated on 2024-09-13 16:30 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Lindsay, G. L.—Chicago Pneumatic Tool Co., Franklin, Pa.
Lisle, T. Orchard—Executive Editor and Gen'l Mgr., MOTORSHIP, New York, N. Y.
Low, Fred—McGraw-Hill Co., New York, N. Y.
Luster, E. J. & Wife & Son—Bolinder Co., New York, N. Y.
McCarthy, C. R.—The Texas Co., New York.
McCaw, J. G.—Freedom Oil Works Co., Freedom, Pa.
McConnell, E. F.—Penn State College, State College, Pa.
McGuire, J. W.—The Texas Co., New York, N. Y.
McQuillen, F—Pittsburgh, Pa.
MacBride, Zenith Detroit Co., Detroit, Mich.
Macconochie, A. F.—University, Va.
Magdeburger, E. C.—U. S. Navy Department, Washington, D. C.
Marsten, W. L.—Sharples Specialty Co., Philadelphia, Pa.
Markley, Frank—Sun Oil Company, Philadelphia, Pa.
Mauntel, C. I.—Westinghouse E. & M. Co., East Pittsburgh, Pa.
Maxwell, A.—National Electric Light Assoc., New York, N. Y.
Meyers, J. H.—American Hammered Piston Ring Co., Baltimore, Md.
Michler, G. H.—Standard Oil Co. of N. J., New York, N. Y.
Miller, Ralph & Wife—Ingersoll-Rand Co., Phillipsburg, N. J.
Miller, H. D.—New York, N. Y.
Moor, H. H.—Micro Machine Co., Bettendorf, Ia.
Moore, H. T.—Sharpless Specialty Co., Philadelphia, Pa.
Moren, H.—American Machine & Foundry Co., Brooklyn, N. Y.
Morgan, A. B.—National Electric Light Association, New York, N. Y.
Morris, A. A.—Gulf Refining Co., Pittsburgh, Pa.
Morrison, L. H.—29 W. 33rd Street, New York, N. Y.
Morton, A. W.—American Hammered Piston Ring Co., Baltimore, Md.
Mullhaupt, A.—Kendall Refining Co., Bradford, Pa.
Newell, Lewis—Eagle Oil Co., Bradford, Pa.
Nibbs, E. & Wife—New London Ship & Engine Co., Groton, Conn.
Nicholas, A. J.—Penn State College, State College, Pa.
Nonnenbruch, Otto—De La Vergne Co., New York, N. Y.
Nolle, C. R.—Gulf Refining Co., Pittsburgh, Pa.
Obermaier, J. A.—Illinois Testing Laboratories, Inc., Chicago, Ill.
Orr, Charles P.—Banner Oil Company, Camden, N. J.
Phillips, R. C.—Harrisburg, Pa.
Phillips, R. S.—Harrisburg, Pa.
Pastre, H. A.—Elliott Company, Greensburg, Pa.
Paterson, D. S.—National Acme Co., Cleveland, O.
Peck, T. A.—Consulting Engineer, St. Louis, Mo.
Picard, A. C. & Wife—McCord Radiator & Manufacturing Co., Detroit, Mich.
Pigott, R. J. S.—Public Service Production Corp., Newark, N. J.
Platt, H. A.—Oil City, Pa.
Platt, W. O. & Wife—209 Central Avenue, Oil City, Pa.
Pope, Joseph—Stone & Webster, Boston, Mass.
Pratt, H. A. & Wife—Ingersoll Rand Co., New York, N. Y.
Queer, E. R.—Penn State College, State College, Pa.
Redfield, Major H.—National Trade Journals, Inc., New York, N. Y.
Reish, W. H.—Penn State College, State College, Pa.
Rex, W. H., Jr.—Link Belt Co., Nicetown, Philadelphia, Pa.
Reker, C. H.—Pittsburgh, Pa.
Ries, E. D.—Penn State College, State College, Pa.
Robb, H. D.—Timken Roller Bearing Co., Pittsburgh, Pa.
Rowland, G. R.—The Texas Co., New York, N. Y.
Russell, W. L.—Worthington Pump & Machinery Co., Buffalo, N. Y.
Sackett, Dean R. L.—Penn State College, State College, Pa.
Seem, Chas.— Lycoming Mfg. Co., So. Williamsport, Pa.
Schmeisser, E. J.—Baltimore, Md.
Schweitzer, P. H.—Penn State College, State College, Pa.
Severin, F. W.—Venn-Severin Machine Co., Chicago, Ill.
Sigworth, R. Y.—Penn State College, State College, Pa.
Smith, H. L. H.—New England Power Co., Worcester, Mass.
Smith, L. C.—Freedom Oil Works Co., Freedom, Pa.
Sorensen, A. K.—The Crane Co., Chicago, Ill.
Soulis, Harold A.—International Motors Co., Easton, Pa.
Sparks, N. R.—Penn State College, State College, Pa.
Splawn, F. R.—The Texas Co., New York, N. Y.
Stetson, R. A.—A. S. M. E., New York, N. Y.
Stevenson, P. V.—Morse Chain Company, Pittsburgh, Pa.
Stillman, K. W.—Automotive Industries, Philadelphia, Pa.
Sutphen, W. A.—Central Hudson Gas & Elec. Co., Poughkeepsie, N. Y.
Thompson, W. G. C.—Penn State College, State College, Pa.
Thuerk, H. C. & Wife—Erie Lighting Co., Erie, Pa.
Tifft, George L., Allis Chalmers Mfg. Co., Milwaukee, Wis.
Torrence, F. M.—Penn State College, State College, Pa.
Ulrich, R.—Bacharsch Industrial Inst. Co., Pittsburgh, Pa.
Underhill, H. L. & Wife—The Bartlett Hayward Co., Baltimore, Md.
Vanderbilt, R. E. & Wife—Baldwin Locomotive Works, Philadelphia, Pa.
Wadman, R. W.—Manager, Oil Engine Power, New York, N. Y.
Ward, R. H.—Managing Editor MOTORSHIP.
Warren, E. R.—Rochester Gas & Electric Corp., New York, N. Y.
Warner, J. A. C.—Studebaker Corporation, South Bend, Ind.
Watson, J. E.—The Elliott Co., Greensberg, Pa.
Weaver, W. H.—Penn State College, State College, Pa.
Weiss, P. A. H.—Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.
Wendt, G. L.—Penn State College, State College, Pa.
Wernberg E. R.—Chicago Pneumatic Tool Co., Franklin, Pa.
Wetter, P. T.—A. S. M. E., New York, N. Y.
Weise, H. O.—Emergency Fleet Corp., New York, N. Y.
Williams, B. B.—C. & G. Cooper Co., Mt. Vernon, O.
Worthington, J. H.—American Hammered Piston Ring Co., Baltimore, Md.
Wright, John—H. L. Doherty & Co., New York, N. Y.
Wynne, F. E. & Wife—Westinghouse B. & M. Co., Pittsburgh, Pa.
Wyzodsky, L.—Baltimore Oil Engine Co., Baltimore, Md.
Yoder, C. P. & Wife—Erie County Electric Co., Erie, Pa.
Yost, Lloyd & Wife—Fairbanks, Morse & Co., Chicago, Ill.
Zollinger, W. H.—Bethlehem Steel Co., Allentown, Pa.

New Stern and Rudder System for Rivertugs

A NEW type of stern and rudder arrangement has been invented by Captain Phil C. Elsey, Master of River Transportation of the Vesta Coal Co., a subsidiary of the Jones & Laughlin Steel Corporation. The former is one of the pioneers in towing on the Western Rivers, and has made a number of important contributions in the construction and operation of river towboats, an important example of this being the first application of the Trojan drive for stern wheel towboats.

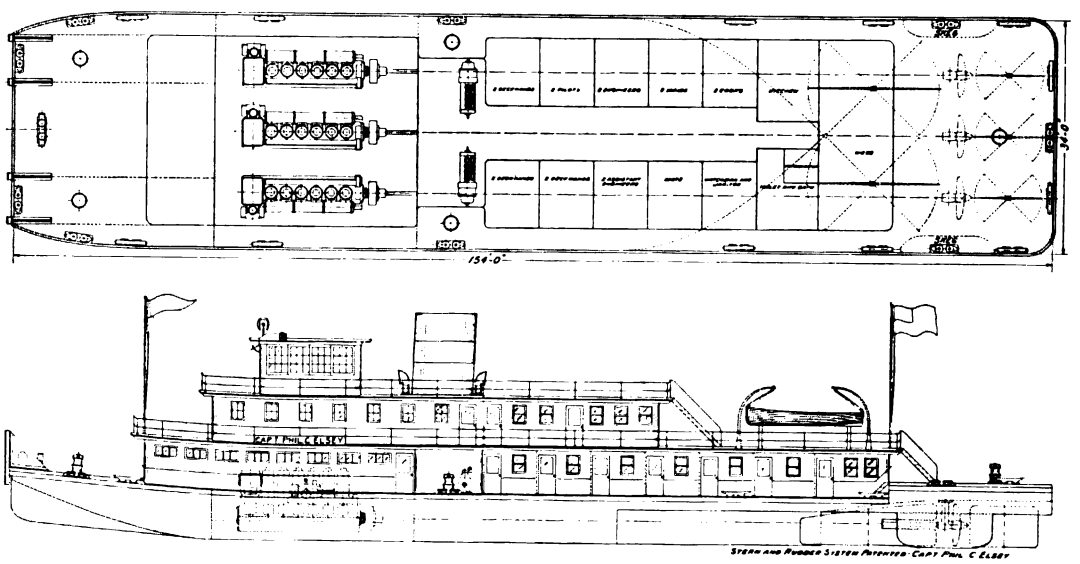
In developing a stern and rudder arrangement which would give the screw driven boat characteristics equal to, or better than, the stern wheel towboat Captain Elsey's patent is unique. The accompanying illustration shows a suggested application of this system to a towboat with three 500 h.p. Diesels.

It will be noted from this drawing that the rear part of the hull is tapered to a point. Then the upper portion of the hull continues on back, curving up slightly to provide space for the rudders and propellers. Two rudders, called the flanking rudders, are placed ahead of the screws and three rudders are placed behind them. When going ahead the water from the propellers impinges against the rear rudders and when flanking, with the wheels in reverse rotation, the water is forced against the front rudders and the inclined surfaces of the hull. The wheels and the rudders are protected by skegs which project downward at each side of the hull. These skegs and the tapered part of the hull form the flank tunnels which are the secret of the rudder power. When the front rudders are swung over to either extreme position the water from all three propellers, when flanking, is directed through one of these flank tunnels. One of the front rudders blocks off its flank tunnel and so all of the water must necessarily flow out through the other propeller tunnel.

Plans for building several towboats with this rudder and stern arrangement are now in the tentative state and their development will be watched with considerable interest by river men. The Fairbanks-Morse Diesel Engine Division and Research Division, in conjunction with Captain Elsey, have drawn tentative plans for the 154 ft. towboat shown in the accompanying illustration. This vessel with three 500 h.p. Diesels would handle a tow of 10,000 tons and would greatly exceed in size any Diesel towboat on the Western Rivers.

Recent tests of a working model at the Naval Testing Basin at Washington, D. C., have very strikingly demonstrated the maneuvering qualities of Captain Elsey's rudder system. The model, driven by three screws operated by motors and a storage battery, was hooked up to barges also constructed to scale and representing a tow of 10,000 tons. The head of the tow responded instantly to flanking movements.

A vessel such as this with three 500 hp. Diesels would handle a tow of 10,000 tons and would greatly exceed in size and Diesel towboat on the rivers.



Plans of 1500 hp. Diesel rivertug with new type stern and rudder system

Generated on 2024-09-13 16:28 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The Shipowner and the Motorship*

The Present Status of World Motorshipping Based on an Analysis of the Fleets of 137 Shipowners, with Special Reference to Scandinavian Owners

By A. C. Hardy, B. Sc.

IN THE BATTLE of the cycles, in the struggle between the relative merits of different makes of Diesel engine, in the controversies which rage over the best method of application of motor drive, the fact tends to become obscured that it is, in the last analysis, the shipowner who determines the success of motorshipping. Will "shipping" become "motorshipping" as "sail shipping" became "steam-shipping" or will it remain—just "shipping"?

This is a matter which is now in process of being settled and an examination of the present status of shipowners' fleets will give some indication of the path the motorship is taking. We know from the returns of Lloyds Register of Shipping that more motorshipping than steam-shipping is under construction in world shipyards, and that the lead established by motor tonnage is very slowly increasing.

Lloyd's figures may be regarded as a very accurate finger upon the pulse of the industry at any given time of publication. It is necessary, however, to dig a little more deeply if we want to attempt to assess something of the general "feel" of the shipowning industry towards the motorship.

Owners and Opinions

Research shows that there are today some 138 motorship owners. Their interest in the motorship is the mean of types of thought and action ranging from those who, having at one time built or purchased one or two Diesel ships, have ordered no more to those who, having ordered motorships, have completely discontinued steam construction. Furthermore, when we realize that the *average date* upon which these 138 shipowners ordered their first motorship was as comparatively recent as 1923, we see clearly that this motorshipping movement is as young as it is amazingly virile.

I speak of motorshipping as a "movement" advisedly because of the vast and increasing tonnage to which the Diesel engine is being applied. The Diesel engine is now threatening to bring about a marine engineering metamorphosis which no other type of prime mover—the turbine for example—has ever done. The metamorphosis is a result of the versatility of application of the marine oil engine—an application which was at first considered to be suited only to long haul cargo vessels, but which has now spread to all types of ships—even to fast cross channel ships. There was never any attempt, it should be remembered, to identify the "turbine ship" in the same way that there is to identify the motorship. The turbine was in some ships merely a more convenient medium for doing what the steam reciprocating engine did. There was no striking fuel economy. The Diesel slashes the fuel consumption 75 per cent even in its present crude form. The increase in number of ship types to which the Diesel is applicable is very definitely not a result of the desire of the shipowner for change or, as has been sometimes unjustly charged, to follow fashion. It is traceable to one factor and to one factor only—that the Diesel engine of all types and sizes uses one quarter of the fuel that any other marine prime mover uses. In other words—it *saves money.*

The Yearly Increase

That is the reason for the yearly increase in the number of motorships completed for service which we can tabulate as follows:—

Increase in Motorship Completions, 1904-1928

Year	No. Completed	Year	No. Completed	Year	No. Completed
1904-5	2	1915	36	1923	85
1908	1	1916	31	1924	106
1909	7	1917	68	1925	185
1910	9	1918	71	1926	159
1911	6	1919	91	1927	235
1912	24	1920	72	1928	...
1913	18	1921	72		
1914	34	1922	84		

* Paper read on May 22-23 before the Swedish General Shipping Assn. and Swedish Society of Naval Architects, Stockholm.

The figures in this table do not, of course, include every motor powered vessel put into the water, but they are collectively representative of ocean tonnage placed in service during the years in question.

This well shows the continued numerical increase of motorshipping, but there is much more we can learn from these figures as well as from an analysis of the numbers of motorships in owners' fleets. In the above tabulation the figures definitely agree with the "average" date on which our list of shipowners took delivery of their first motorships.

For example, in 1923, the number of motorships completed was 85. This, increased during the year 1924 to 106 and during the year 1925 to 185. These years showed a falling off in popularity of geared turbine sets for freighters. The year 1923 saw the delivery of first motorships to the Rotterdam Lloyd Co., and marked the initiation of their steamer replacement program. In this year also Alfred Holt & Co. took delivery of their first motorship. In 1923, too, were completed the Gotaverken-built motorships KOLSNAREN, LUOSSA and OXELOSUND—pioneers of their type.

The development of motorshipping which we have chronicled above is not, however, by any means running along parallel with the lines upon which steamer construction was developed. There is a tendency towards standardization in Diesel engine construction, created by engine builders partly with a desire to simplify manufacturing processes and partly with a desire to reduce costs. This means that a given engine for a given ship is not necessarily a custom built proposition as the steam engine always was.

The Diesel engine was born inland. Its early development was on inland waterways. Inland companies have always been associated with Diesel engine development, and today many marine Diesels are constructed with complete success hundreds of miles from the seaboard, in Europe and—especially—in America.

Shift in Shipbuilding Centre of Gravity

It is not too much to suggest, in fact, that motorshipping has caused a slight shift in the world centre of gravity of shipbuilding. I refer here especially to the part played by Scandinavian and German shipowners in this movement.

It is true also, of course, that the gradual substitution of oil for coal as a maritime fuel has had far reaching effects upon shipping and shipbuilding conditions. One fact appears to stand out very clearly and that is the part played by Scandinavian shipyards in building motorships for world trade routes and by Scandinavian shipowners in supplying the world with motorship service. It is not too much to suggest that the motorship movement owes a great deal of its success to this.

Sea trade today is no longer a matter of national sentiment. The shipowner whose vessels give the service gets the cargo regardless of flag and the shipowner who senses the superior service the motorship gives to the shipper—on long haul trade routes—will get the business. Most Scandinavian owners have long realized this.

In our big table of motorshipping distribution by owners, we find that Scandinavian shipowners to the number of 30 are at present operating in major sea transportation work a total of no less than 209 motorships. Included in this list are lines like the Axel Johnson line which took delivery of its first motorship in 1913 and which now owns 14 motorships and no steamers. Of this 14, a total of 5 ships was constructed and powered in Gothenburg by the Gotaverken Co., one was built and powered by the Kockums Co., in Malmo, while the remainder were built and powered by the Burmeister and Wain Co., Copenhagen.

It seems fairly safe to assume that this company has ceased to regard steam power as of value to its services. The same remarks would appear to apply also to companies like the East Asiatic Company of Copenhagen, which, with a total of 20 motorships and only 3 steamers, was actually the pioneer company

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Table of World Motorshipping—1927-28

Distribution by Shipowners

(With other pertinent data.)

Name of Company	Nationality	No. of Motorships	No. of Steamers	Date of First Motorship	Engine Type Favored, If Any	Remarks
Adelaide S.S. Co	Aus.	7	28	1925	B. & W. 4-cyc	All new construction Diesel
Admiral S.S. Co	Am.	9	14	1916	McIntosh & Seymour	
Adria Co	It.	1	18	1928	Fiat 2-cyc	New construction. Last new ship 1910
Albyn Line	Br.	1	4	1925	H. & W.-B. & W	
Amer.-Hawaiian	Am.	2	24	1922	Cramp B. & W	Last new construction motorships
Anglo-Amer. Oil Co	Br.	6	19	1920		Also operate 15 motorbarges. Newest construction motor
Anglo-Chilean Nitrate Co	Am.	1	..	1928		Newest constr. converted Diesel
Anglo Saxon Co (and subsidiaries)	Br. & Du.	46	43	1908	Werkspoor	All new "ocean" construction of Diesel type
Atlantic Refining Co	Am.	6	13	1924	Ingersoll-Rand Electric. drive	New construction all Diesel-electric
Atlantic Transport	Br.	1	5	1914	H. & W.-B. & W	
Belfast S.S. Co	Br.	4	5*	1929	H. & W.-B. & W	Replacing all steam by Diesel Newest construction Diesel
Bergen S.S. Co	Nor.	7	43	1919	B. & W	
Bibby Line	Br.	5	8	1920	Fairfield-Sulzer	All newest construction Diesel
Borga Co	Nor.	4	4	1918	B. & W	Newest construction Diesel
Borgestad Co	Nor.	5	2	1925	B. & W	No steam construction since 1907
Lobitos Oilfields Ltd. (Bowring)	Br.	1	4	1928	B. & W	Newest tanker Diesel
British-India	Br.	8	117	1921		
British Motorship Co	Br.	2	0	1925	B. & W	
British Tanker Co	Br.	13	64	1924		Majority of new construction Diesel
Brostrom, Axel	Sw.	6	16	1925		All new construction Diesel
Brusgaard Co	Nor.	2	20	1916		
Burns, Philp	Aus.	1	8	1925	B. & W	Newest construction Diesel
Chambers, James	Br.	4	11	1925	N. E.-Werkspoor	All new construction Diesel
China Nav. Co	Br.	2	73	1926		
Christensen, Ivar A.	Nor.	8	4	1924	B. & W.	All new construction for Garcia & Diaz trade, Diesel
Clan Line	Br.	2	49	1929		
Coast Lines, Ltd	Br.	1	38	1912		
Comm. & Dominion Line	Br.	7	21	1925	Doxford	All new construction Diesel
C. G. T.	Fr.	7 (building)	92	....		New construction Diesel. Building complete fleet for Pacific Coast trade.
Comp. Nac. de Nav. Cost	Braz.	7	24	1928		New construction Diesel
Comp. Trasmedit	Sp.	6	69	1923	M. A. N.	Fast passenger ships now Diesel
Cosulich Co	It.	4	16	1926	B. & W.	All new construction Diesel
Dalgleish S.S. Co	Br.	2	12	1924	B. & W.	
Dansk Fransk Co	Da.	2	8	1928	B. & W.	New construction Diesel
Donaldson Line	Br.	2	10	1925	Vickers	New construction Diesel
E. Asiatic Co	Da.	20	3	1912	B. & W.	First to adopt motorships and have discontinued steam entirely
Elder Dempster Co	Br.	13	60	1918	B. & W.	All new construction Diesel
Entre Rios Railways	Br.	2	2	1926	B. & W.	All new construction Diesel
Fearnley & Eger	Nor.	6	10	1924		All new construction Diesel
Furness Withy Group	Br.	22	47	1922	Doxford and B. & W.	Have abolished steam on most services
Flensburger S.S. Co	Ger.	2	0	1924	Krupp 4-cyc.	
Glen Line	Br.	8	6	1916	H. & W.-B. & W.	Have discontinued steamer building
Grace Lines	Am.	6	21	1924		2 building
Grangesburg-Oxelosund Co	Sw.	10	14	1921	B. & W.	
Gulf Refining Co	Am.	6	24	1919		All new ships Diesel. 3 building
Hamburg-American Line	Ger.	29	139	1921	2-cycle	All new construction Diesel with 3-cycle engines
Hamburg-Sud	Ger.	4	16	1924	M. A. N., geared	
Hansa Line	Ger.	6	34	1925		New construction Diesel
Harris & Dixon	Br.	1	1	1924		
Henderson, P.	Br.	1	14	1928		
Hogarth & Sons	Br.	1	36	1924		
Holland America Line	Du.	2	34	1921		Newest ship (1923) Diesel
Holt, Alfred	Br.	10	46	1923		Newest construction Diesel
Houlder Line	Br.	3	8	1925	Fairfield-Sulzer	New construction Diesel
Hunting & Sons	Br.	3	3	1924		All new construction Diesel
Horn Line	Ger.	12	..	1924		All new construction Diesel
Inter Island Steam Nav. Co	Am.	3	9	1907(?)		
Johnson, Axel	Sw.	14	..	1913	B. &. W.	Discarded steam
"K" Line	Ja.	2	27	1926		Newest construction Diesel
King Line	Br.	9	9	1927	H. & W.-B. & W.	All new construction Diesel
Knutsen, Knut	Nor.	3	7	1925	B. &. W.	
K. Ndl. St. Maat	Du.	1	91	1922		
Klaveness & Co	Nor.	11	9	....		
K. Paket. Maat	Du.	13	113	1913	Werkspoor	Building 6 motorships
Lamport & Holt	Br.	3	42	1921	H. & W.-B. & W.	Must build Diesels soon to meet competition

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

World Motorshipping—1927-28

Name of Company	Nationality	No. of Motorships	No. of Steamers	Date of First Motorship	Engine Type Favored, If Any	Remarks
Lawther Latta	Br.	1	5	1929		New construction Diesel
Limerick S.S. Co.	Br.	2	11	1910		
Lloyd Brasiliero	Braz.	4	78	....		
Lloyd Nacional	Braz.	4	12	1927	Fiat	All new construction Diesel
Lloyd Triestino	It.	7	39	1925	B. &. W.	New construction Diesel
Lyle Shipping Co.	Br.	3	3	1924		
MacAndrews & Co.	Br.	7	17	1927	H. & W.-B. & W.	All new construction Diesel
MacIver Line	Br.	2	5	1923	H. & W.-B. & W.	Newest construction Diesel
Mess. Maritimes	Fr.	2	56	1926		Newest construction Diesel
Mitsui Co.	Ja.	3	28	1924		Newest construction Diesel
Moller, A. P.	Da.	6	26	1921	B. & W.	
Moss & Co., H. E.	Br.	1	11	1925		
Mowinckels Rederi	Nor.	5	7	1920		
Muller, Wm.	Du.	1	9	1927		Newest construction Diesel
Munson Line	Am.	2	21	1919		
Nav. Gen. Gerolimich	It.	2	7	....		
N. G. I.	It.	4	21	1912		Newest construction Diesel
N. L. T.	It.	6	29	1925	B. & W.	All new construction Diesel
Netherland S.S. Co.	Du.	3	38	1917		New construction Diesel
Nelson Line	Br.-Am.	4	12	1928	H. & W.-B. & W.	All new construction Diesel
"Neptune" Co.	Ger.	3	57	1925		Latest construction Diesel
Nippon Yusen Kaisha	Ja.	4	94	1929		Newest construction including 3 big liners Diesel
N. D. L.	Ger.	5	132	1923		
Norwegian-American Line	Nor.	3	15	1923		Just ordered Diesel liner
North Coast S. N. Co.	Aus.	2	21	1927	B. & W.	New construction Diesel
Northern S.S. Co.	N. Z.	5	26	....		
Olsen, Fred	Nor.	13	37	1920		Newest construction Diesel
Orient S.S. Co.	Da.	5	4	....	B. & W.	Newest construction Diesel
Osaka Shosen Kaisha	Ja.	7	126	1924	Sulzer	Newest Ships Diesel
P. S. N. C.	Br.	8	17	1917	H. & W.-B. & W.	
Rodby Havn S.S. Co.	Da.	4	3	....		
R. M. S. P.	Br.	5	40	1922	H. & W.-B. & W.	All new construction Diesel
Runciman & Co., W.	Br.	3	19	1924	Doxford	Newest construction Diesel
Rotterdam-Lloyd	Du.	8	37	1923	Schelde-Sulzer	Replacing all steam
Shaw Savill	Br.	4	16	1928	Sulzer	All new construction Diesel
Skogland Line	Nor.	1	7	1925		
Sloman, Rob., Jr.	Ger.	2	19	....		Owns Rotor Ship
Smith Christen	Nor.	7	2	1924	Arm.-Sulzer	Building up big motor fleet
Soc. Naz. de Nav.	It.	3	13	1918	Fiat	Fleet now sold to Soc. Ravano
Soc. Ven. de Nav. a Vap.	It.	2	12	1925		New construction Diesel
Sotar & Aznar	Sp.	1	36	1923		Newest construction Diesel
Standard Fruit & S.S. Corpn.	Am.	1	5	1926		Reported interested in further Diesel construction
S. O. Co. (N. Y.)	Am.	5	..	1924	McIntosh & Seymour	New construction Diesel
S. O. Co. (Cal.)	Am.	8	14	....		New construction Diesel
Standard Sh. Co.	Am.	2	36	....		New construction Diesel
S. O. Co. (Cal.)	Am.	3	31	....		New construction Diesel
Stockholm S.S. Co.	Sw.	4	90	1920		
Straits S.S. Co.	Br.	3	46	1924		
Sutton, E. J. & Co.	Br.	1	3	1924		
Swedish-American Line	Sw.	3	4	1925	B. & W.	Newest construction Diesel
Swedish-Amer. Mex. Lines	Sw.	3	3	1919	B. & W.	Newest construction Diesel
S. E. Asiatic Co., Ltd.	Sw.	5	7	1921	Gotavergen-B. & W.	Newest construction Diesel
Tankers, Ltd.	Br.	5	4	1921	Vickers	
Thomson (S. & J.) Kerr Line	Br.	12	..	1924	Doxford	All construction Diesel
Transatlantic S.S. Co.	Sw.	11	19	1918	Gotaverken-B. & W.	Newest construction Diesel
Trelleborg Angfartygs Co.	Sw.	2	14	1929		Newest construction Diesel
Trinder Anderson & Co.	Br.	1	4	1926		Newest construction Diesel
Union Castle Line	Br.	4	35	1926	H. & W.-B. & W.	Three liners building
Union S.S. Co. of N. Z.	Br.	3	66	1922		Newest construction Diesel
United Fruit Co.	Am.	3	39	1923		
United Molasses Co.	Br.	5	6	1925	Kincaid-B. & W.	All new construction Diesel
United S.S. Co.	Da.	9	89	1913	B. & W.	All new construction Diesel
U. S. Shipping Board	Am., 16 motorships and 12 being converted					
U. S. Steel Products Co.	Am.	4	34	1923		
Van Ommeren Co.	Du.	6	4	1916		New construction Diesel
Weir Andrew	Br.	24	16	1909	H. & W.-B. & W.	All construction now Diesel
W. Australia Government	Aus.	3	0	1915	H. & W.-B. & W.	All construction Diesel
Westfal Larsen & Co.	Nor.	5	12	1925		All new construction Diesel
White Star Line	Br.	1	24	1929	H. & W.-B. & W.	Newest construction Diesel
Wiel & Amundsen	Nor.	1	1	1926		Newest construction Diesel
Wilh. Wilhelmsen	Nor.	27	19	1921	B. & W.	Discontinued steam
Winge & Co.	Nor.	3	1	1920	Werkspoor	Newest construction Diesel
Ybarra & Co.	Sp.	3	33	1921		Newest construction Diesel

• Building. † Ships now sold to Soc. Ravano.

Table of World's motorship tonnage clearly shows vital need for big American conversion and construction program

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Typical Scandinavian Motorships Operating in American Trade

Name	Nationality	Owner	Service	Size	Power	Remarks
Svealand	Sw.	A. Brostrom	Cruz Grande—Sparrows Pt.	20,600 dw.	4,000	20 years' charter to Bethlehem Steel Co.
Lulea	Sw.	Grangesburg-Oxelosund	New York—R. Plate	8,300 dw.	2,150	Chartered to Moore McCormack, New York.
Hoyanger	Nor.	Westfal Larsen	San Francisco—R. Plate via Magellan	8,350 dw.	2,800	Operated by General S.S. Co.
Primero	Nor.	I. A. Christensen	Montreal—R. Plate	6,700 dw.	4,700	Operated by Garcia & Diaz, New York
Tisnaren	Sw.	Transatlantic S.S. Co.	San Francisco—Australia	9,250 dw.	3,450	Operated by General S.S. Co.
Gundersen	Nor.	Tichfield S.S. Co.	Boston—Jamaica	2,400 dw.	1,300	Chartered to United Fruit Co.
Nordvard	Nor.	L. Kloster	Philadelphia—Hamburg	7,500 dw.	2,100	Chartered to Hamburg-American Line.

All the above motorships are Scandinavian built and owned, but they seldom touch Scandinavian ports. They operate from American ports carrying American freight.

in long haul motorship operation with the SELANDIA and has not built a steamer since. It is true also of others.

23 Owners Discontinue Steam

Of the 30 Scandinavian owners listed in the big table we can report 23 as having either discontinued steam construction entirely or having powered their newest ship with Diesel power or having just taken delivery of their first motorship. The remaining 6 owners all appear to be satisfied with their Diesel tonnage, but there is nothing definite to show what their future policies will be. A similarity is shown in analyzing the fleets of other owners and nationalities.

Outside of the big Kylsant and Furness groups, Great Britain has not shown any particular enthusiasm for motorships—particularly in her tramp and charter type tonnage. During the last 18 months or so this attitude has been changing and many owners hitherto entirely wedded to steam have placed orders for motorships in order to get first hand information as to their economy of operation.

Other owners—of all nationalities—we may note, who built their first motorship in 1921 or 1922, have ordered no others. The reason for this is generally bound up in the type of engine originally selected. Many types of Diesel engine in production 5 and 6 years ago, today have ceased to exist. Either they were too expensive to build or their design was not a practical one. Unfortunately many shipowners bought such engines and afterwards were so discouraged with their choice that they decided to keep to steam in future. It is easy to understand why their decision was arrived at. Engine building companies today will have an extremely difficult task to re-influence such owners.

At the present time, however, there is no reason in the world for a shipowner to adopt anything but a well tried model for his ship. The method of drive is a question over which some different opinions may be held. Many people suggest as a golden rule—"Straight drive for a straight freighter, Diesel-electric drive where the auxiliary load exceeds 25 per cent of the total power in the ship." There is much in support of this golden rule. But good engines are the keynote.

If, now, we glance at the column in the big table which records the type of engine favored, we shall find that the majority of Scandinavian and all the Kylsant controlled British companies use the Burmeister & Wain design. The preponderance of this type is well marked. The majority of people who use it make it standard for their fleets. On the other hand the big and ever expanding Furness Withy group uses Burmeister and Wain, Doxford, and Fairfield Sulzer types. In the Anglo Saxon fleet one finds a preponderance of the Werkspoor 4-cycle type which was used in the first Anglo Saxon tanker in 1910 and which has been much favored in the 45 motorships which have followed. German companies like the Hamburg-American Line which is now building practically nothing but motorships are partisans of the 2-cycle double acting engine, the highly developed M.A.N. type proving very popular.

The Dutch companies, Rotterdam Lloyd and Netherland SS. Co., both of which have given up steam construction, strongly favor the Sulzer type. The Atlantic Refining Co., pioneer of Diesel-electric drives, favors the Ingersoll-Rand 4-cycle Diesel.

Standardize Your Engine Types

There is a great deal to be said, at this stage of Diesel development, in favor of the shipowner who standardizes the engine type in his fleet. Many big and successful owners of motorships today are doing this. Standardization makes for ease of operation, interchangeability of operating staff and of machinery parts, a unification of fuel and lubricating oils used and many other advantages. Moreover such a policy is quite safe today.

It scarcely comes within the scope of this paper to express an opinion as to which is the best type of engine. Obviously different types of engine are suited to different services. There is a distinct tendency towards an elimination of the weaker and less practical types and for this the shipowner can be thankful. Double-acting Diesels of both 4-cycle and 2-cycle types are being developed to an increasing extent for the 14- and 16-knot freighter fleets which are being designed for long haul routes. In Germany there is a tendency to build big freighters with passenger accommodation, powered by a single double-acting Diesel.

Scandinavian Motorships on World Trade Routes

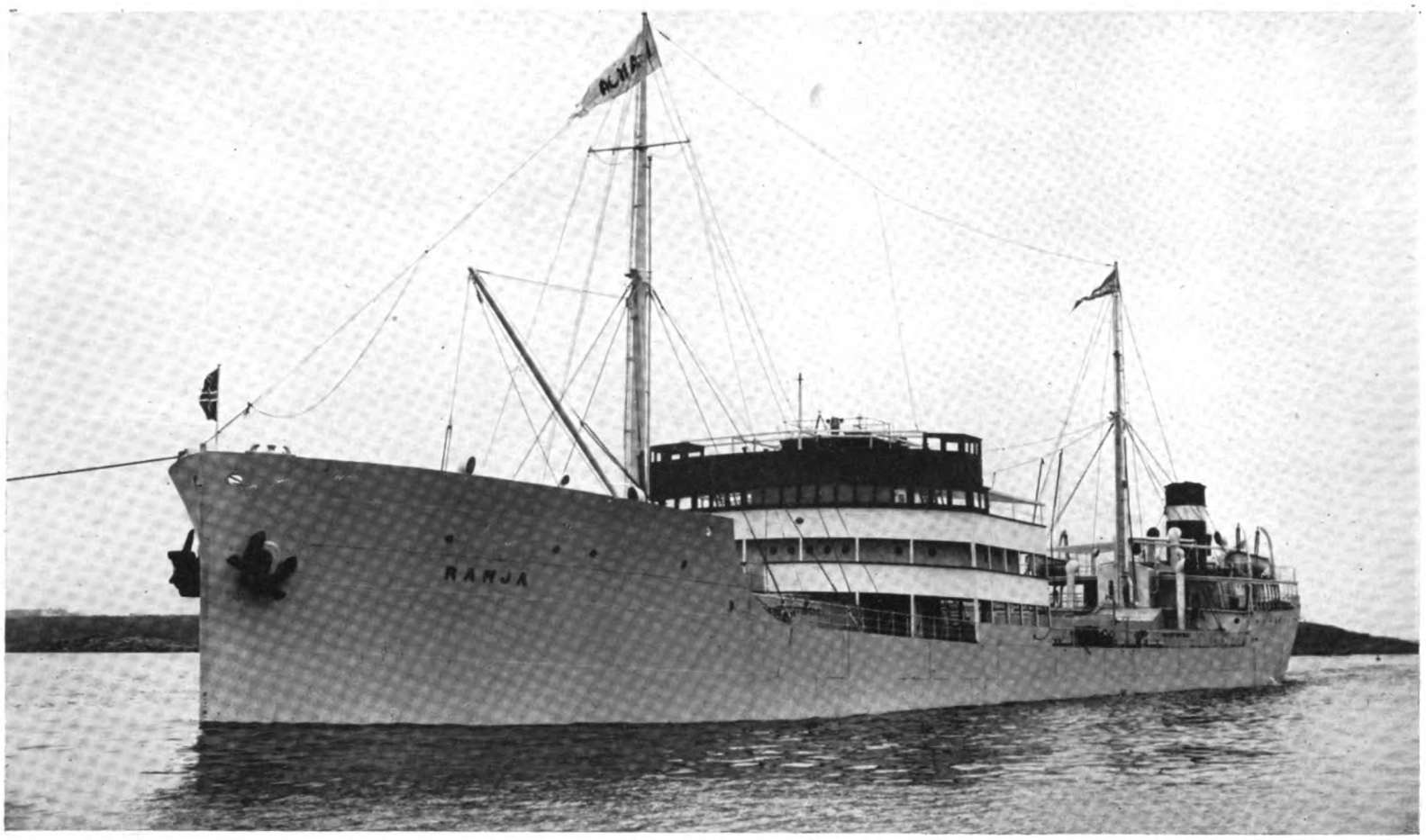
I think I am correct in stating that Scandinavian shipowners operate what, in America, would be called the world's largest trucking business. Scandinavian ships are busily occupied all over the world carrying other people's freight. A calculation I made in December, 1927, of world motorshipping by national distribution showed that Scandinavian nations own roughly 34 per cent of motorships on long haul trade routes. Of this 34 per cent of world motorshipping that Scandinavia owns, a percentage second only to that of Great Britain is employed in bringing Europe's wheat from the River Plate, in taking U. S. Pacific Coast produce to the Far East, and lumber to Australia, in bringing Brazilian coffee to San Francisco and in carrying American produce from New York to the River Plate. A total of about 70 per cent of all Scandinavian motorshipping—I found in my research—is engaged in tramp work. Couple this with the fact that Scandinavian shipowners have the second largest motorshipping group in the world, and then it is possible to wonder whether the statement, that with the advent of the motorship the tramp is tending to disappear, is correct. As a matter of fact that statement is correct in the general but not in the particular,

Typical Motorships of Different Years Showing Advance in Technique

Year	Service	Nationality	Owner	Size	Power	Type of Engine	Cyl. Drive	Speed
1909	Tanker	Ru.	Nobel Bros.	4,800 dw.	1,000	4-cyc. S. A.	19.29x29.13	9
1910	Tanker	Du.	Anglo-Saxon	1,194 dw.	460	4-cyc. S. A.	15.75x23.6	9-10
1912	Freighter	Da.	E. Asiatic Co.	7,400 dw.	1,800	4-cyc. S. A.	20.88x28.75	12
1913	Freighter	Sw.	Axel Johnson	6,550 dw.	1,600	4-cyc. S. A.	19.7 x26.0	10
1914	Freighter	Da.	E. Asiatic Co.	9,020 dw.	2,400	4-cyc. S. A.	24.8 x37.8	12
1915	Freighter	Br.	P. S. N. C.	6,300 dw.	2,200	4-cyc. S. A.	24.8 x33.5	11
1916	Tanker	Br.	Anglo-Saxon	9,640 dw.	2,500	4-cyc. S. A.†	20.88x33.0	9
1917	Freighter	Sw.	Axel Johnson	6,520 dw.	2,150	4-cyc. S. A.	23.23x35.43	11
1918	Freighter	It.	Soc. Ravano	7,800 dw.	2,200	2-cyc. S. A.	24.8 x35.44	11
1919	Freighter	Sw.	Sweden-Am. Mex.	7,800 dw.	2,150	4-cyc. S. A.	23.23x35.43	11
1920	Tanker	Br.	Anglo-Am. Oil Co.	10,500 dw.	2,500	4-cyc. S. A.†	24.5 x39.0	10
1921	Passenger/cargo	Br.	Bibby Line	10,370 dw.	4,500	4-cyc. S. A.	29.13x45.28	12
1922	Freighter	Br.	Union S.S. Co. of N. Z.	10,600 dw.	3,500	4-cyc. S. A.	26.5 x47.0	12
1923	Passenger/cargo	Br.	British India	8,260 dw.	3,200	2-cyc. S. A.	26.77x43.3	12
1924	Passenger	Ger.	Ocean Line	6,000 gr.	2,800	4-cyc. S. A.	25.59x39.37	13
1925	Passenger	Sw.	Sw.-America	17,300 gr.	13,750	4-cyc. D. A.	33.07x59.05	15
1926	Passenger	Br.	Union-Castle	20,000 gr.	20,000	4-cyc. D. A.	33.07x59.05	15
1927	Passenger	It.	N. G. I.	27,000 gr.	27,000	2-cyc. D. A.	27.25x47.25	16

†Airless injection.

Generated on 2024-09-13 16:38 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



The latest Götaverken product—the 422-foot, 9,000-ton motortanker Ranja. She is propelled by two 1500 h.p. Götaverken-B. & W. engines, which gives her a speed of 11.9 knots. She is owned by Rederi A/S Ruth of Oslo

the difference being that whereas in the old days the steamer was a literal tramp, picking up cargoes here and there, the motor tramp—particularly the Scandinavian one—operates on long term charters. Distinguish here, however, between ships like the SVEALAND and AMERIKALAND, Swedish-owned, German-built bulk motorfreighters operated under a 20-year charter to the Bethlehem Steel Corp. to carry ore between Cruz Grande and Sparrows Point, Md., and a motorship like the FALSTERBO, operating a short term charter in trans-Pacific trade. The ore-carrying ship ERIK FRISELL, commissioned in June, 1926, provides an important illustration of the working life of a modern Swedish tramp. She was built by Gotaverken for the Grangesburg-Oxelosund Ore Co. Leaving Gothenburg on July 15 in ballast she proceeded to San Pedro, California, via Panama Canal, averaging 12 knots for the trip with the exception of the run through the canal. Fuel was taken at San Pedro, and then the vessel want on to Coos Bay and the Columbia River to load lumber for Shanghai. With this heavy lumber cargo including a high deck load of lumber she averaged 11½ knots across the Pacific. From Shanghai she came in ballast to the Fraser River and Vancouver, B. C., to load a lumber cargo for Yokohama, being in British Columbia waters during the early part of November. At the present time she is operated between New York and Santos, Montevideo, Buenos Aires and Santos by Moore and McCormack Co., with two other motorships of the Grangesburg Oxelosund Co.

Previously the ERIK FRISELL had been operated on charter in similar service by Garcia & Diaz, New York.

Then, again, there are ships like the small Gotaverken-built fruit carrier GUNDERSEN, running under long term charter to the United Fruit Co., and the Pacific Coast-S. America motorships of the Westfal Larsen Co., operated by the General Steamship Corp. of San Francisco.

A big percentage of Scandinavian motorshipping constructed during the last few years has been built expressly for use by American operators, and of existing motorship tonnage now in service a total of 10.3 per cent is actually American operated but foreign-owned.

Garcia and Diaz at the present time operate three Norwegian owned, Danish built motorships. They are now taking delivery of a further fleet of motorships for their South American trade including some highly efficient 16-knot motor passenger liners, which will be of very great use in this highly competitive trade.

Competition on ocean trade routes was never greater than at the present time. Nations are becoming increasingly inter-dependent. No nation today is self-sufficient. The segregation of world into regions of definite producing character for world use is, in the eyes of many economists, a near possibility. This will mean ever increasing demands upon the shipowner and it will mean that the vehicles of transportation he uses must be of the first quality. Transportation is day by day becoming a more exact science and it demands that its instruments shall be of the best. The increasing international popularity of the motorship is unquestionable the shipowners' reply to this demand.

Items of World Wide Interest

The Götaverken advises us that *seven* cylinder, four-cycle Götaverken-B. & W. Diesel engines will propel the two 104,000 cubic ft. capacity, 17-knot fruit carriers building at their yard in Gothenburg. The high speed, and number of cylinders per engine make these motorships noteworthy. Length, 267 ft.; beam, 37 ft. 6 in.; depth, 24 ft. They will be chartered by the United Fruit Co. of Boston, for $12,000 per month. These ships will cost about $385,000 each, so the owners—says 'Syren & Shipping'—will make a profit of about $62,000 per annum per ship.

According to the Transportation Division of the Department of Commerce, Washington, D. C., the largest motorvessel yet built for the River Elbe has just been placed in service. This craft has a capacity of 750 tons and is propelled by two Sulzer 140 s.hp. Diesel engines. The boat is owned by Robert Mueller of Hamburg.

Two 540 hp. Worthington two-cycle type airless-injection Diesel engines, and two 80 hp. auxiliary engines of the same make, have been delivered to the Trimount Dredging Co. as the results of the operation of a 12″ suction dredge equipped with a 450 hp. Worthington Diesel engine.

Have you ordered your copy of the 1928 MOTORSHIP MANUAL?

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

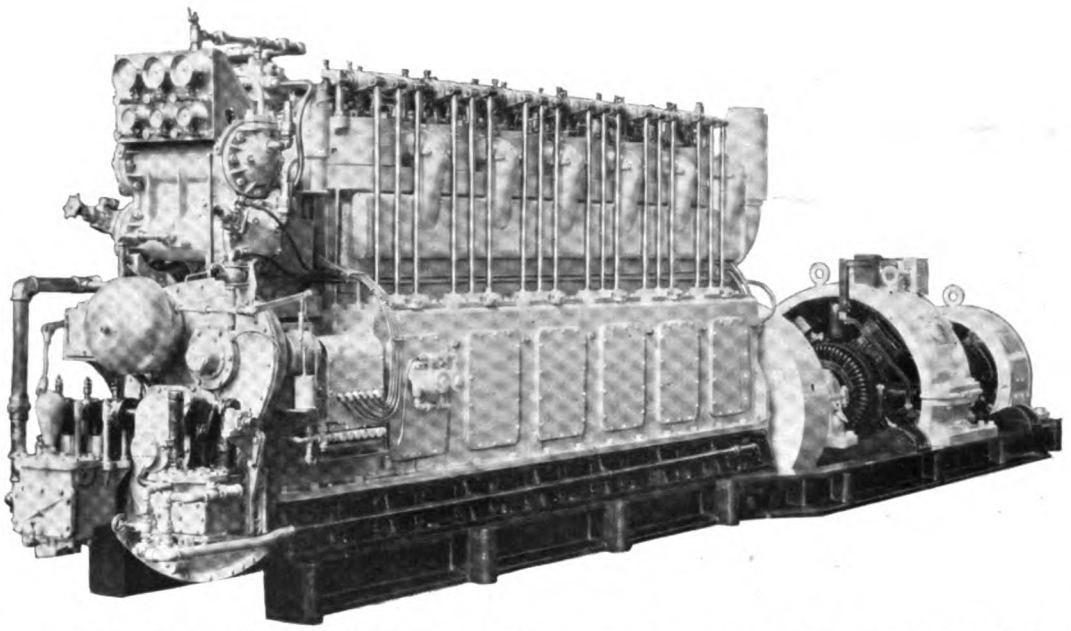
Diesel-Electric Drive for Package Service

Middlesex Transportation Co.'s New River-Harbor Freighter Reveals Excellent Economies as Well as Maneuverability

THERE are in existence today quite a large number of coastwise, harbor and river workboats, tankers and ferries with Diesel-electric propulsion, the same not being restricted to larger vessels. One of the first small craft to be equipped with Diesel-electric power was a Boston trawler built about eight years ago, since then big engineering strides have been made.

Because of the extremely flexible maneuvering qualities of Diesel electric drive in service in harbors and rivers congested with shipping, this form of power is likely to be seen more frequently in the future, especially as it affords pilot-house control, enabling the navigator to meneuver the ship and simultaneously control the propeller speed and direction.

Last January we published plans of a new type of package freighter of 250 tons d.w. building for New York-New Jersey service for the Middlesex Transportation Company of New Brunswick, a subsidiary of Johnson & Johnson. EDWARD F. FARRINGTON, as the boat has since been named, is now in operation and is noteworthy by reason of her power plant being of the Diesel-electric type, and for the useful work in which she is engaged. When it is realized that her fuel bill at full power and fully loaded is only $1.50 per hour it is understandable why we discuss her once more.



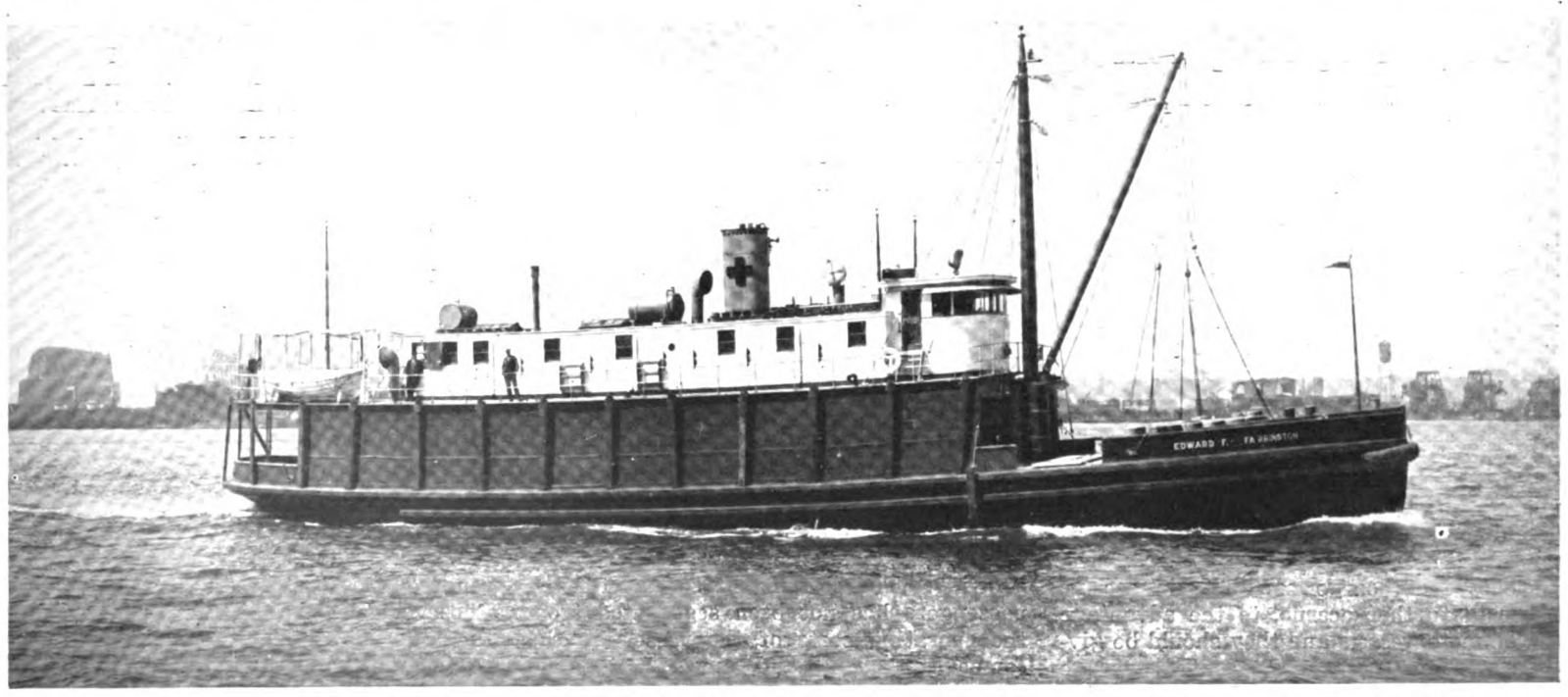
One of the Winton-General Electric Diesel-Electric drive units of the EDWARD F. FARRINGTON

The EDWARD F. FARRINGTON operates between New Brunswick, N. J., and New York City, supplementing an extensive trucking business carried on by the owners, who are manufacturers of hospital and surgical supplies. She was designed by Eads Johnson, 115 Broadway, New York, and built by the Bethlehem Shipbuilding Company at Quincy, Mass. Her power plant consists of two Winton, 4-cycle, trunk-piston, air injection Diesel engines each of 250 hp. at 375 r.p.m. These are direct-connected to 165 kw., 250 volt d. c. generators, and 15 kw. exciters. Directly coupled to the propeller shaft there is a 400 s.hp. at 160 r.p.m. shunt wound d.c. General Electric motor.

The vessel has only been in operation a short time, but so far her fuel consumption worked out at 30 gallons per hour at full load. This means a cost of only $1.50. Her two 2,000 gal. fuel tanks provide 130 hour service when operating at a speed of 12 miles per hour and carrying 150 tons of package freight. She has a steel hull and steel housing. Following are the general particulars:

Length, oa.	120 ft.
Length, wl.	120 ft.
Breadth	30 ft.
Depth	12 ft.
Capacity at 7 ft. 6 in. mean draft	125 tons
Capacity at 9 ft. mean draft	250 tons
Power of each Diesel engine	250 b.hp.
Power at propeller shaft	400 s.hp.
Engine speed	375 r.p.m.
Propeller speed	160 r.p.m.
Fuel consumption per hour	30 gals.
Hourly fuel cost	$1.50

In the engine-room there is an auxiliary



No steam vessel of her size operating in New York-New Jersey waters can compare in economy with the EDWARD F. FARRINGTON

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Diesel-generator set consisting of a 12 hp. Hill engine, 4 kw. Electro-Dynamic generator, Rix air-compressor and a 165 gal. per min. capacity Northern bilge and fire pump, and one motor-driven fresh water pump. On such an otherwise complete electrical ship one would expect to see the heating and cooking carried out by electricity, but we presume the owners prefer to keep down the auxiliary power as low as possible. However, the American Engineering Co.'s steering gear is of the electric type driven by a 7 hp. motor, and controlled by a Cutler Hammer helm angle follow-up type controller mounted on a brass pedestal in the pilot house. There is also a hand steering gear of the Eads Johnson immediately-controllable type. For the cargo hoist there is a Lidgerwood double-drum electrically driven unit, operated by control levers in the pilot house, the hoist itself being located in the forward hold.

Ample opportunity for cost compilance is available to the owners as they have in service two small steam-driven freighters, namely, the DENY BROTHERS and the JAMES W. JOHNSON, which have been making a service over the same route averaging 100 tons per day.

The EDWARD FARRINGTON departs from New Brunswick at 5 A.M. and arrives at Pier 16 North River, New York, about 9 A.M. the same morning. She discharges at her terminal pier and then makes deliveries of larger consignments to other piers or to outward bound steamers. Then reversing procedure, she takes shipments aboard from steamer arrivals or shore points where freight is offered in sufficient volume, calling at Pier 16 to complete loading. She leaves about 3 P.M. in the afternoon and arrives at New Brunswick about 7 P.M. the same day, and immediately discharges and takes on her next day's cargo, when work is stopped at night.

This "live" schedule calls for a good speed underway, quick maneuvering at the piers or alongside steamers, rapid cargo handling, *and a good crew.* So it is not surprising that every care has been taken for the comfort of the latter, encouraging a good class of men. Spacious quarters are provided in the upper deck house, including staterooms for a crew of 16 officers and men, tile washrooms and showers and a large galley.

Of course, she is not restricted to handling Johnson & Johnson freight exclusively, but carries material for other factories such as rubber for the Michelin Tire Company, cork and linseed for the Janeway Company, and refrigerating machinery from the Brunswick Kroeschell plant. They are afforded express service at freight rates. Packages and perishables are stowed in the steel deckhouse served by two rolling steel doors forward and by two side ports, the doors being used when alongside ocean freighters and the side ports at the piers.

Located in the middle of the State of New Jersey, New Brunswick is well suited as a center for collection and delivery of package freight moving to and from New York City. Acting as a feeder to the ships the Middlesex Transportation Company has a fleet of 24 auto trucks with terminals in Trenton, Philadelphia, Newark, New Brunswick and New York City. At New Brunswick there is a Municipal dock

Income Tax, Sale of Vessels and Importation of Yachts

THE Revenue Act of 1928, Sec. 707, amends the second paragraph of Merchant Marine Act to read as follows:

"During the period of ten years from June 5, 1920, any person, a citizen of the United States, who may sell a vessel documented under the laws of the United States and built prior to January 1, 1914, shall be exempt from all income taxes that would be payable upon any of the proceeds of such sale under the Revenue Act of 1918, or under any subsequent Revenue Act in force during such ten-year period, if the entire proceeds thereof shall be invested in the building of new ships in American shipyards, such ships to be documented under the laws of the United States and to be of a type approved by the board. The basis of any such new ship shall be reduced by the amount of the gain from such sale exempt from taxation under this paragraph."

Sec. 708 Definition of the term "Motor Boat."

The term "motor boat," when used in the act of September 21, 1922, includes a yacht or pleasure boat, regardless of length or tonnage, whether sail, steam, or motor propelled, owned by a resident of the United States or brought into the United States under its own power, but does not include a yacht or boat used or intended to be used in trade or commerce, nor a yacht or boat built, or for the building of which a contract was entered into, prior to December 1, 1927.

Sec. 431. Tax on Use of Foreign-Built Boats.

Section 702 of the Revenue Act of 1926 (imposing a tax on the use of certain foreign-built boats) is repealed, to take effect July 1, 1928.

However, a customs duty of 30% ad valorem has been substituted under the new law on all foreign yachts brought into American waters after December 1st last by American owners. This covers all foreign-built pleasure craft built and contracted for since that date. So many large Diesel yachts have lately been ordered abroad by Americans that the new law has produced much satisfacton among domestic yacht and engine builders.

Two 350 shp. Diesel engines have been ordered for a sand dredge to be built for the Great Lakes.

Economy of Operating Costs of U. S. S. B. Motorships

(*Continued from page* 577)

the table showing interest requirements and net annual savings on page 575. Government borrowings today are made at 2¾ per cent. Interest is charged at this rate and 3¾ per cent is available for sinking fund payments to amortize the cost of conversion in a period of about 20 years.

Thus the Government is secured against loss. That it will make out even better on these vessels than is here shown is certain, because under no single head have the motorships been shown any favor in this comparison, whereas on the contrary the steamers have been purposely favored as detailed in one place and another above. Benefits from cargo earnings do accrue, and will further accrue, to the advantage of the motorvessels and they should be given benefit for it. Moreover the average higher speeds provide in the course of a year about 7 per cent greater earnings because of the considerable extra fraction of a voyage made during that period of operating expense.

In course of time, with the development of the Australian and Indian trades, the annual advantage of the motorships—i.e., both savings and extra earnings—may climb to $60,000 per annum, in comparison with the steamers, the oil-burner then of course being superior to the coal burner, as already indicated for such conditions.

Though that part of the vessel improvement cost which was not necessitated by the Diesel conversion has been excluded as a charge upon the engine economy, nevertheless, in order to prevent misunderstanding, the statement should be added that this investment is likely soon to be covered by the passenger traffic, which is steadily growing. The cost of the service for the passengers has not been segregated from the operating costs of the vessels in the comparison above, and, since there is no passenger traffic overhead, the passenger fares would represent in large part a net revenue. From a rigid accounting point of view this statement would of course have to be revised, but it may be admitted as a general indication that tends greatly towards justification of a Shipping Board expenditure that has been considerably misunderstood and not a little criticized by well meaning but misguided critics.

This is perhaps the first time a report has ever been published, showing how far the savings in the direct cost of operation of motorships have proved able to cover the cost of their conversion from steam power. If the full consideration of the motorship gains on the same route, i.e., including extra earnings as well as savings, can later be published, it will show a greater motorship superiority than is generally believed. The study here outlined was rendered possible by the courtesy of the Roosevelt Line, but they are relieved from the responsibility for the final figures, that responsibility being upon the writer of this article.

Generated on 2024-09-13 16:30 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

More On The New Ford Conversion

Work Progressing on Lake Ormoc, Converting for Use in Crude Rubber Transportation from Amazon Plantations to Deep Water

PERSUING their well-known policy of thoroughness in all undertakings the Ford Motor Company is converting the Shipping Board steamer LAKE ORMOC to Diesel drive, as announced in MOTORSHIP some months ago. This work is being carried out at their own Fordson plant, and when completed the ship will be one of the finest conversions of her size afloat. We are now enabled to release definite information about the new general arrangement of machinery space and quarters.

The LAKE ORMOC is one of several Great Lakes freighters built during the war, but she is not the conventional laker with machinery aft and bridge forward on the forecastle head. The engine-room is located amidships with cabins and accommodations above on the shelter and bridge decks. By this arrangement similarity in appearance to the well known "three island" type of ship is produced. The dimensions permit her to pass through the smallest locks of the Welland Canal system, which is the route she will take in proceeding to the Amazon where she will eventually transport crude rubber from the new Ford plantations to the coast to be picked up by larger vessels for transportation to the United States. In this way the Ford interests will link up their tropical activities with the northern industrial organization.

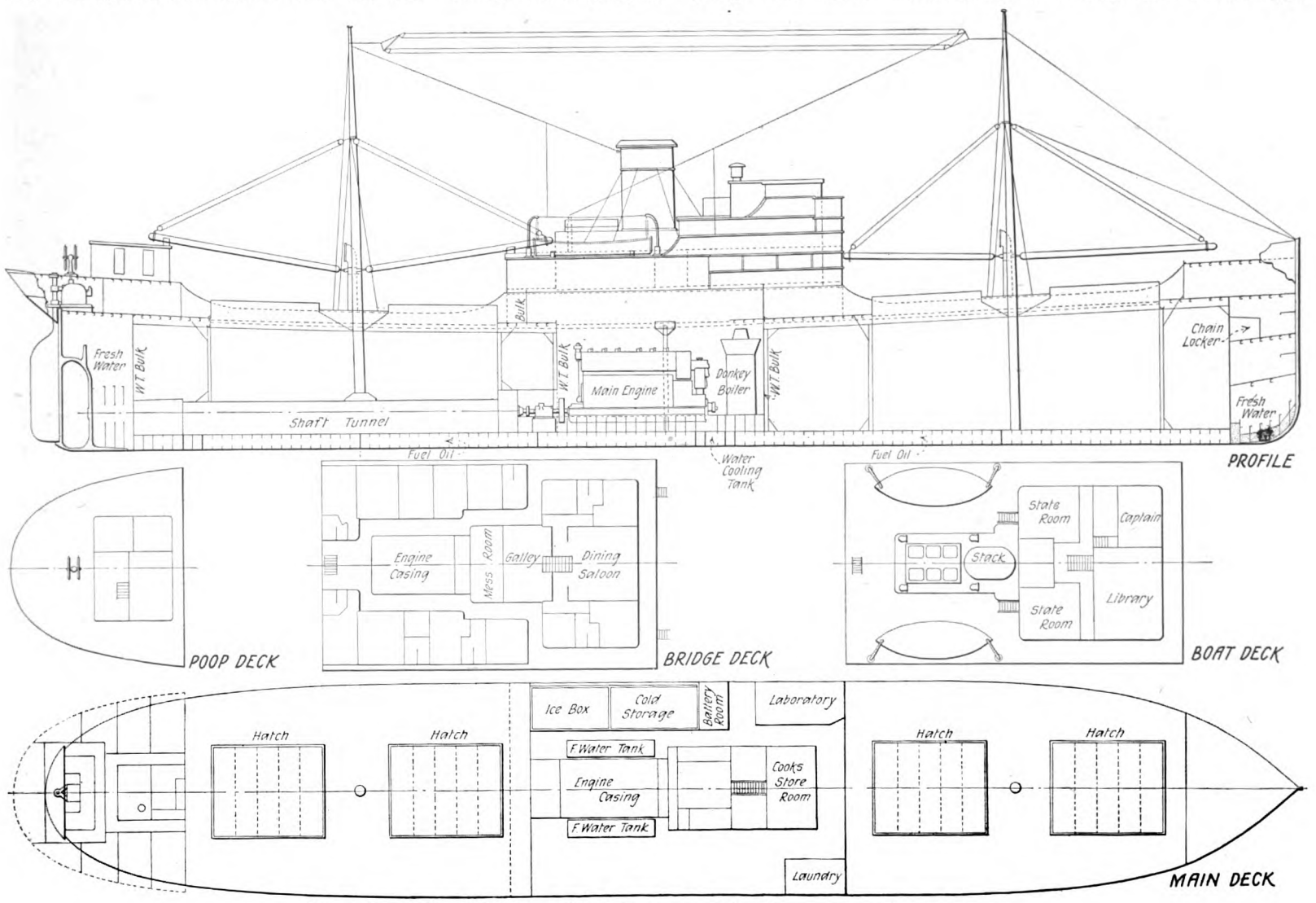
The LAKE ORMOC, in making the Amazon trips will travel about 750 miles each way and be limited in draft to 15 ft. There is no intention of placing her in long haul voyages from Brazil to the United States. Special equipment is being provided for the comfort of the crew and others aboard, which is, of course, necessary on a vessel that operates in the tropics.

The main propelling unit is to be a Busch-Sulzer standard, single-acting, two-cycle, air-injection engine, now being installed to couple to the original shafting. A contract rating of 1000 s.hp. at normal speed of 165 r.p.m.—with 6 power cylinders, 17 in. x 27 in.—permits a conservative M. E. P. of 65.4 per sq. in. and piston travel of 742.5 ft. per min.

The engine design is builder's standard throughout, with built-in, tandem, double-acting scavenging-air pump and three stage air-compressor, each direct driven by its own separate crank at the forward end. The crankshaft, a solid-forged type, in two main sections and one forward section, is carried in main bearings supported by a single casting bedplate which is provided with heavy transverse bridges. The crankcase for the six power cylinders is also a single casting with large doors both front and rear opposite each crank, and with another section bolted to this for scavenging pump and compressor.

Crossheads are of the central guide type with a double-faced shoe at each end of the crosshead pin. Each of these two double-faced shoes bears between two vertical flat guides solidly fastened each side to the heavy ribbing of the crankcase—giving equal area for both directions of side thrust. Adjustments are made by shimming behind the shoes.

Contrary to the usual steam engine practice, there is but one working bearing on the crosshead pin as the lower end of the piston rod (instead of the upper end of the connecting rod) is "forked." This permits the use of a single box in the upper



Inboard profile and plans of Ford steam-to-Diesel conversion LAKE ORMOC

Generated on 2024-09-13 16:28 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

end of the connecting rod insuring better lubrication and ease of adjustment.

Pistons are built in two pieces, the "head" which carries the piston-rod and piston rings, and the "skirt" which functions to close and open the inlet and exhaust ports. The well-established double-ported scavenging system as developed years ago by Sulzer is employed. Aside from the inherent advantage that the builders claim this system given for complete scavenging and re-charging, they point out that it permits the use of a perfectly symmetrical cylinder head, with but one central opening (in the middle) for the cage which contains both starting valve and fuel valve. And further that this head embodies absolutely free and unobstructed space inside its walls for passage of cooling water.

The valve gear is unusually simple and extremely light, there being but one valve per head mechanically actuated while the engine is running. Fuel needles are not packed, which eliminates danger of sticking. Necessity of packing around needle is obviated by use of a short horizontal shaft which is oscillated by a lever. This shaft is outside packed and in turn lifts the needle by means of forked arm working on the needle collar.

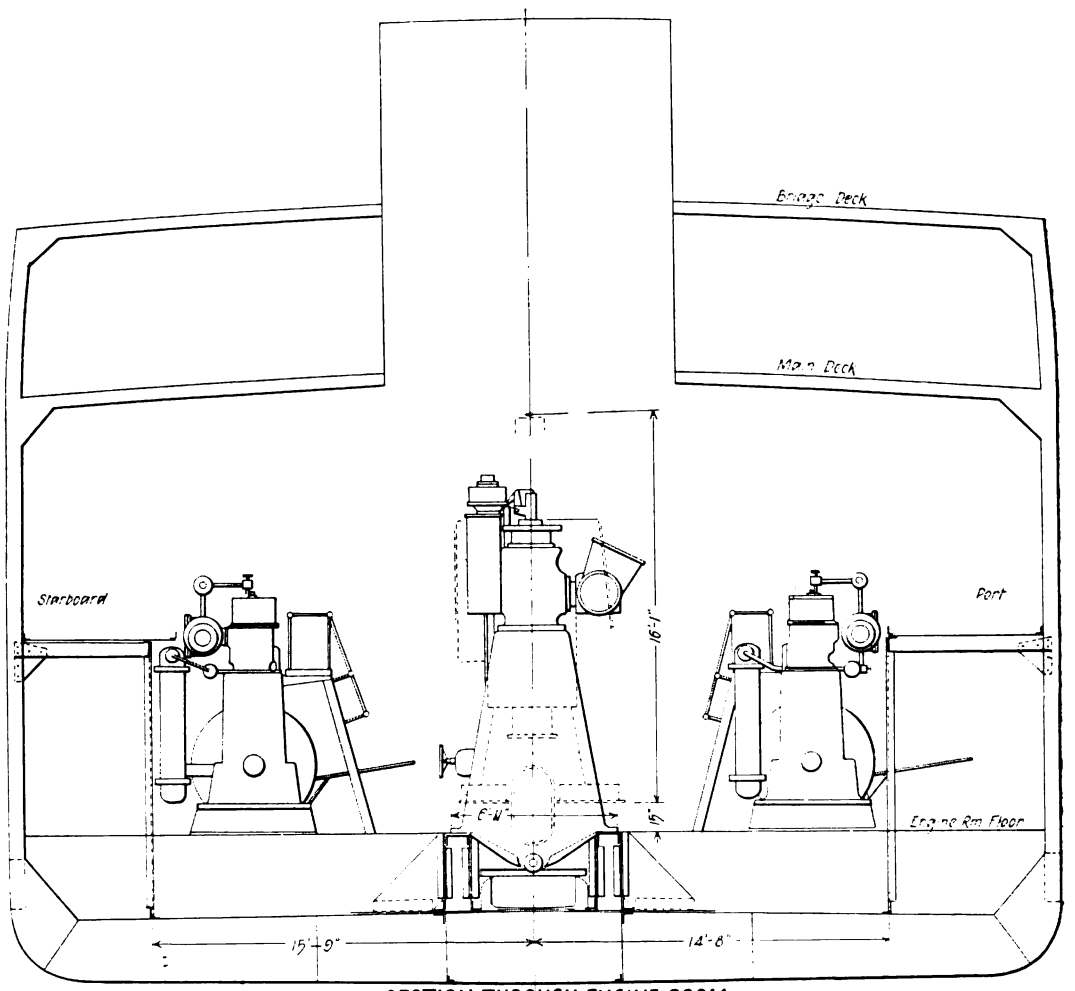
Reversing and control gear are similar to that furnished on the four 3000 s,hp. Busch-Sulzer six-cylinder engines supplied for U. S. Shipping Board vessels. The control station is below the platform at center of the engine. A system of double sets of cams and bell-crank linkage brings ahead or astern timing into action and the change is effected automatically by a small air motor controlled by a hand wheel.

Lubrication is Busch-Sulzer standard force-feed system as developed by them in 1915, with attached pump which picks up oil from the sump and from a discharge header forces it to each main journal through the lower bearing shells and thence, by holes drilled in the crankshaft and connecting rods, to the crank pins and crosshead pins. This oil after leaving the bearings (working from center to the edges) collects in the bottom of the crankpit and drains to the sump. Mechanical lubricators furnish oil for the lubrication of the walls of cylinder liners and for the piston rings.

The fuel pumps are operated from a vertical shaft and controlled by the governor. There is one pump plunger for each working cylinder. The amount of fuel is regulated by the relative time of closing of the by-pass valves which are in turn controlled by the governor. Automatic regulation of the valve on intake of air-compressor is also controlled by the governor thus adjusting the injection air to suit the load.

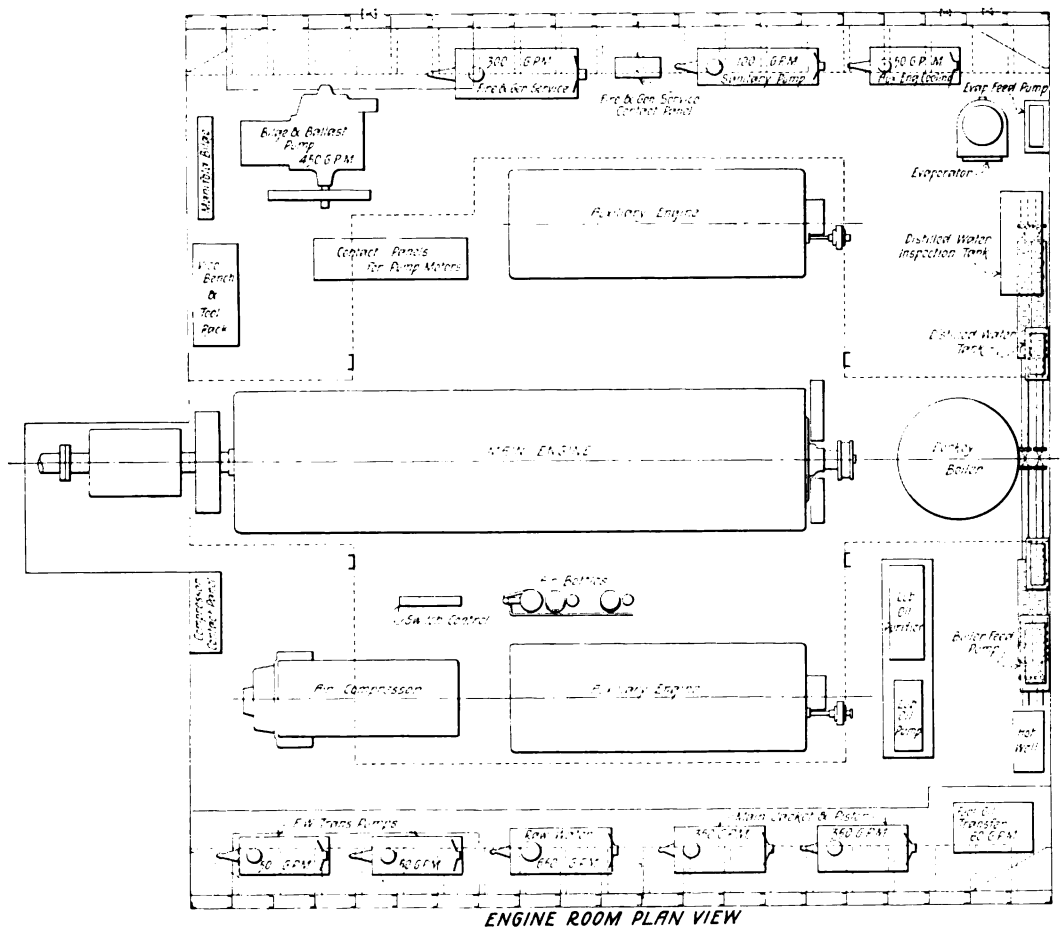
The net weight of this engine, including platform and flywheel, but exclusive of air-tanks, fuel and lubricating oil tanks, spares and engine-room piping, is approximately 200,000 lbs. The length of the bedplate holding down flange is 27 ft. 11 in.; the height from center line of crankshaft is 13 ft. 7 in. to the top of the engine and 16 ft. 1 in. to crane hook for removal of pistons.

The machinery arrangement has been carefully planned as revealed in the plan. Our illustrations cannot, however, give all interesting details of the new plans. On the shelter deck between the main and bridge decks are located a number of large store rooms. These include separate rooms for engineers', cooks', electricians' and deck stores in addition to the ice-box and cold storage rooms which are located on the port side aft. On both sides of the engine



SECTION THROUGH ENGINE ROOM LOOKING AFT.

Cross section of engineroom of LAKE ORMOC



ENGINE ROOM PLAN VIEW

The new engineroom layout of the LAKE ORMOC *is very neat and compact.*

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Underside of cylinder head of Busch-Sulzer Diesel engine for Ford conversion.

casing, on this deck, are fresh water domestic tanks, while in the starboard after corner is a large machine shop with power driven lathe, shaper, milling machine, hack saw, grinder, tool grinding machine and simplex radial drill. In the starboard forward corner is a large laundry, while located on the port side forward is a lavatory. Directly aft of the engine casing is a control panel room for after deck machinery, with doors leading to port and starboard alleyways.

The starboard elevation reveals on the machinery flat (from forward to aft) a switchboard, two balancing sets, emergency air compressor, two steam driven generator engines and fuel oil settling tank. Suspended below this flat is a maneuvering air lubricating oil cooler and cooling water heat exchanger. Below these on the engine-room floor level are the pumps as shown in the plan view.

An example of forethought in providing comforts in the tropics is forced ventilation in the quarters, which is too frequently overlooked by the designer. Although ample room seems to be provided for everything and every person aboard we find no waste space. Even the stack is usefully employed. It is of eliptical shape with an extreme dimension, for and aft, of 10 ft. 6 in. Leading up to the atmosphere are an 18 in. main engine exhaust, 26 in. donkey boiler smokestack, 10 in air duct, two 8 in. auxiliary engine exhaust pipes, one 4 in. atmospheric steam exhaust and boiler safety valve vent pipe. The air and steam whistle pipes are also in the stack, retained for other than sentimental reasons.

Throughout the entire cabin arrangement one observes an unusual solicitude for the crew, not only in the captain's suite of rooms, but down in the messboy's quarters as well. This is characteristically a Ford policy. In a vessel so small one would not expect to find spacious quarters such as were provided on the EAST INDIAN. However, in addition to the regular accommodation for officers and crew we find on the bridge deck two large staterooms. A library adjoins the captain's accommodation. On the deck above are located the wheel house and chart room.

The Ford fleet of motorships is growing. We understand that five more Lake-type steamships may be converted within two years. At the present time this firm operates a sufficient number of vessels to place them amongst important ship owners of America. Evidence of which is revealed in the following list of Ford vessels:

Seven 850 i.hp. ocean type coal-burning steam tugs.

One 600 i.hp. coal-burning steam tug.

One 400 i.hp. coal-burning steam tug.

Two 12,500 tons Diesel Lake motorships.

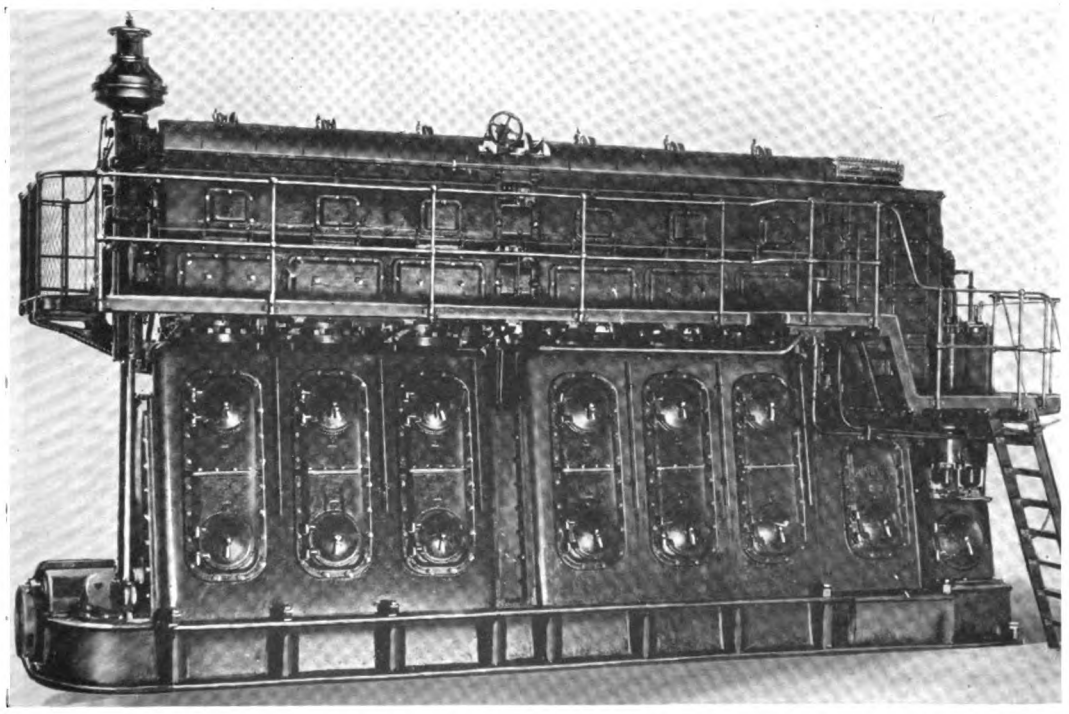
Diesel driven ocean cargo-ship EAST INDIAN.

Oil burning cargo steamers ONONDAGA and ONONGA.

New conversion to Diesel ORMOC.

Lake Benbow and Lake Gorin, both oil burning Lake steamers carrying lumber and general.

We find this to be a good omen. Activities of this company have always resulted in success. Ford has set an example in industry which has been followed by many of the leading industrialists of America. May we venture to predict another similar example in transportation?



Busch-Sulzer 1,000 *b.hp. Diesel engine of type that will propel the Ford motorship* LAKE ORMOC

Powerful Diesel-Electric River Towboat

THE hull of a Tennessee Coal, Iron and Railroad Company, Diesel-electric tugboat, is about to be laid down. The dimensions of this boat are:—length, 140 ft., beam 25 ft. and depth nine ft. three in. She will carry a sheer forward and aft. These dimensions were fixed by the size of the locks on the Warrior and Tombigbee Rivers where she will operate between Birmingham and Mobile, Alabama, a distance of 419 miles.

The locks can take a tow 280 ft. long by 50 ft. wide and as the towboat will handle seven barges, of standard size 140 ft. by 25 ft., in each tow, the entire fleet will be enabled to pass a lock in two lockages. There are 17 of these locks one of which is the double type requiring two lockages. A portion of the Warrior River passes through the alluvial district, has a number of sharp bends and at times swift current. Navigation in waters such as this require a maximum maneuverability of tugs handling barges and it is believed that the Diesel-electric towboat will more efficiently meet this requirement.

Designed to give the maximum of comfort in accommodations for the crew, this 1100 hp. craft will be one of the most modern and up-to-date towboats operating on any river in this country. She will be electrically equipped throughout, with the exception of the galley and heating facilities, the latter being provided by a small donkey boiler, which will also furnish steam for syphoning the barges when necessary.

Her power plant consists of two 550 hp. Nelseco Diesel engines, direct connected to two 335-kilowatt 250-volt 250-r.p.m., dc. generators. Each propeller, of 7 ft. 3 in. diameter, will be driven by a shunt-wound double motor of 400 horsepower at 140 r.p.m. and 250 volts. Power for auxiliaries and lighting, as well as for excitation for the main generators and propelling motors, will be furnished by two 40 k.w., 120-volt, compound-wound, direct current, auxiliary generators. These will be driven by the main engines and will be mounted directly on the shaft extensions of the main generators. Variable voltage control is arranged for operation either from the pilot house or the engine room.

It is expected that the boat will be put in service about the end of the present year a second boat has since been ordered.

Exhausting Thru Hollow Mast

The Marine Engine & Supply Company, of Terminal Island, in southern California, is building a double-ended, 40′, Diesel-driven, heavy duty cruiser for E. E. Converse, of Santa Paula, California, from designs by D. M. Callis, of Los Angeles. The new boat, which has not been named, is of 10′ 9″ beam, with a single screw, turned by a 40 hp., Cummins Diesel engine, will exhaust through a hollow steel mast. Auxiliary equipment is electric.

Generated on 2024-09-13 16:32 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Seagoing Standards Applied to Riverboat Construction

Present Day Trend in Diesel Tonnage on Ohio River and Disappearance of Obsolete Steamboat Is Changing Construction Methods

PRESENT indications point to a vast increase in transportation of freight on the Western rivers. At the same time we find an almost universal movement toward the total abandonment of steamboats in favor of Diesel-powered craft. It has been accurately stated that the old steamboat is dying a natural death as the result of its inherent inefficiency. A significant event in this respect was the recent placing under the auctioneer's hammer of the steamers H. G. HILL and HORTON FALLS at Nashville, Tennessee, which wound up "steamboating" on the Cumberland river. Simultaneously the Standard Unit Navigation Company, who will use nothing but Diesel power, announced the opening of their line on this river where the steamers failed. These two steamers represented an original investment of $80,000 we are told and one was sold for $710.00 while the other brought $3,700. They were not old enough to be worn out or the hulls rotted.

This is but one of the many similar examples. But to meet adequately the potential freight movement on the rivers of the great Mississippi River basin, it is necessary to build more Diesel-powered boats. One will be described in this article. Before taking up the details of her arrangement and construction let us see what a diminutive speck she is in the great scheme of inland water transportation.

To those who think the rivers are not used, page 530 of the Department of Commerce Yearbook 1925 should change their opinion. In 1925 river transportation in the United States carried 102 million tons of traffic, which has increased considerably since then. The Great Lakes carried only 95 million tons. Our total overseas commerce with foreign nations was 82 million tons during the same year. Perhaps some say that the rivers are not used because in the same year tonnage carried by our railways reached the stupendous total of 1,115,000,000 tons. In other words, the total of our domestic commerce is so vast that an inland waterway system, even though it carries more tonnage than moves out of our seaports, is lost in the rush of packages and bulk freight.

The Government survey shows the rivers with a navigable length of 25,000 miles. On these 25,000 miles, including the canals and other channels, owned publicly and privately, the total commerce was 52,000,000 tons in 1923, valued at $1,000,000,000. gold.

The rivers have failed to maintain their early prestige in our commerce and to grow with the country. Considering the many factors favoring river transportation this failure is astonishing. The rivers are well located as transportation arteries. They connect New Orleans, St. Louis, Kansas City, Omaha, St. Paul, Minneapolis, Cincinnati, Louisville and Pittsburgh. With coal moving west, grain moving east, grain moving south, timber moving north, sugar moving north, manufactured goods moving west and south—vast traffic possibilities come crowding into the mind.

Nobody questions the cheapness of water transport. If ocean steamers plying through the Panama Canal can underbid, on New York to San Francisco business, railroads which trace a straight line between the two cities, the question is surely answered. Furthermore, the tremendous success of the Great Lakes trade and the wonderful growth of the cities on their banks are evidence of the success of water transport in domestic trade.

It is fair to say that the rivers must have some great weak spot. There is only one question to discuss before adopting this conclusion. It is often said that the railroads killed the rivers, which is untrue. The railroads are not keeping the river traffic down today by successful throttling tactics. They are as helpless against a superior method of transportation as the waterways were against the railroads. The railroad was a faster method of transpor-

The Alpha taking her first dip in the waters of the Kanawaha river at the plant of the Chas. Ward Engineering Works

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.3
Public Domain, Google-digitized / http://www.hathitrust.org/access_us
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

tation to the old steamboat trade, and the latter failed to advance in proportion to the growth of the railroads.

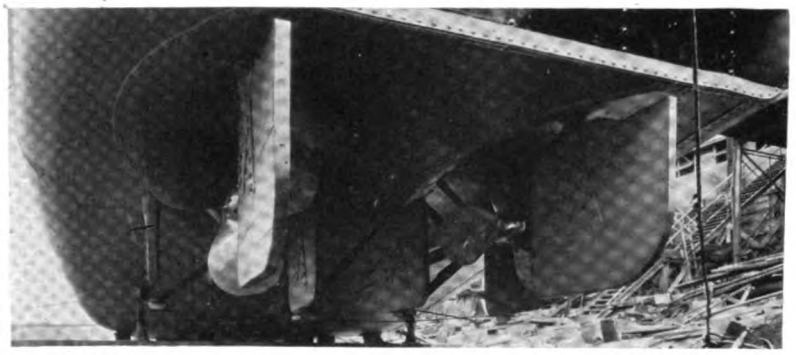
With so many other points in its favor why didn't the river system develop as the railroad did? The steamboat was the weak link in the armor of the old river trade!

The river packet is a picturesque old anachronism. Its fatal weakness was its inefficiency. Basing their conclusions on this thought we find a number of prominent men who predict a future growth of river transportation will be made possible only with further river improvement, and the universal adaption of Diesel drive for river craft.

There appears to be a state of confusion existing as to what is the most suitable form of propelling mechanism for Diesel-powered river boats. According to a high official in one of the largest ship and barge building plants on the Ohio river, the prospective motor-tug owner is besieged on all sides with advocates of the tunnel-stern propeller system, the solid stern-wheel, the split-wheel, direct drive, through chain and reduction gears, belts and shafting inside the boats with sprocket chains outside. There is Diesel-electric drive, which may be used in conjunction with any one of these.

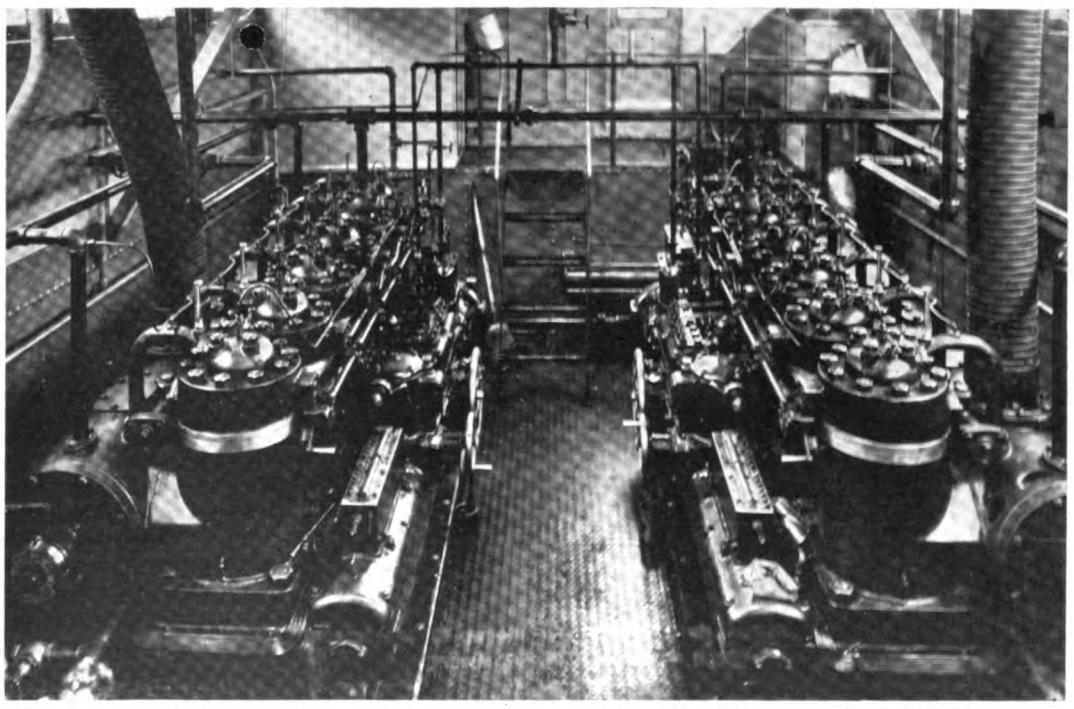
Beyond a doubt each system has its advantages which are being proved in different forms of river service. It is not the opinion of any fair minded man that any one of them will prove so superior to all others as to reduce the systems to a single one. But, it is universally agreed that no hope can be placed in steam, and that the oil engine will be the only form of motive power found on the rivers in the future. Therefore we find at the present time that Diesel towboats are swarming the western rivers and that this is only a start. It is confidently expected, with the completion of the dams and locks on the Ohio river, which will take place next year, that a vast increase in river tonnage will occur and that the motive power will be Diesel engines.

Economists of vision have long been stating the great truth that the ideal transportation system is one in which rails, highways and waterways bear each their just burden singly and co-operate with each other to produce the greatest efficiency from the whole system. Heretofore, the rivers have not been carrying their share of the load. There is a satisfaction to the economist to see his theory made workable and proved sound. Romance is associated with the thought of Cairo, Illinois, or Hannibal, Missouri, as a seaport; but romance is not a balance-sheet factor. Tomorrow the artist may paint and the historian will chronicle the conquest of the rivers. Today is still the architect's day—the day of cold, practical calculation and plan. And we are concerned with what is taking place today.



Tunnel type stern showing twin screws and six rudders

At the plant of the Charles Ward Engineering Co. on the banks of the Kanawha river, the twin-screw harbor boat ALPHA was just delivered to her new owners. She is a tunnel-type boat of exceptionally sturdy construction intended for river work at St. Louis. The dimensions are length 85 ft., beam 21 ft. and depth 6 ft. The power plant consists of two six-cylinder two-cycle Fairbanks-Morse 180 h.p. Diesel engines. Since the ALPHA is intended for day work only, no provision has been made for crew accommodation or cooking aboard, so the entire interest centers about the machinery installation and the structure.



Engine room of the Alpha showing clean cut machinery arrangement with Fairbanks, Morse engines, resembling a seagoing installation

It seems unnecessary to dwell at length upon the subject of her fuel economy. It is not possible to greatly reduce it, or increase it, as the result of different methods of operation. If for any reason it becomes abnormally high, troubles of a mechanical nature may occur. If the rate of fuel consumption decreases the power output of the engines falls away proportionately. Mechanical troubles may be chargeable to methods of operation, but the rate of fuel consumption becomes automatically fixed with the installation of Diesel power. The fixed rate can be no more than one-third of the amount consumed by the most efficient steamboats of the same power, while the less efficient steam-craft require from four to ten times the amount used by a river motor-tug of the same power.

Aside from the question of fuel economy, it is conceivable that motor-tugs would be used on the rivers in preference to steamers if the cost of fuel were equal, excluding the item of the weight of fuel consumed. The increased radius of operation resulting from Diesel drive is a distinct advantage enjoyed by the motor-tug over the steamer and the weight of fuel consumed is a governing factor. Greater dependability and lower cost of maintenance are also important factors in favor of Diesel drive. This is no idle boast; it is an actual fact that the motor-tug is more dependable and less expensive to maintain than the steamboat.

It will be observed that we make no reference to Diesel powered passenger-boats. This is because they have not been introduced on the rivers. It is rumored, however, that a revival of passenger service will result from demonstrated performance of motor-tugs on the rivers.

Improvement in boat design may be credited to the use upon the rivers of oil engines. Fifty years has seen but little advance in design of river steamers. River men have been content to fight a losing battle, against superior methods of transportation on land, with the same kind of boats their fathers and grandfathers used. When the oil engine entered this field conditions changed. If for no other reason, new types of boats appeared because the old types of boats did not prove adaptable to oil-engine drive. Although the Diesel engine is responsible for the development of new type boats, it has required the present combination of boat and engine to result in success.

We are using the ALPHA as an example of one of these. We might pick at random and find any number of others which would serve equally well. But in so doing we might find one which would not so adequately serve our purpose. Besides, we have personally inspected the ALPHA. She was completely planned before she was

Generated on 2024-09-13 16:28 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

built. She was laid out in a mould loft just as if she were a big ship. Her plates and frames were turned out in a well-equipped plate and angle shop. Portions of her hull were fabricated before she was assembled. Although American Bureau

Loosening propeller blade through the air-lock, a special feature of the Alpha

classification is not required on river craft she was built to the highest standards and would meet the requirements of classification societies. She is riveted throughout. No welding was done where strength is required. The seams are all chipped and caulked. A hydrostatic test was placed on all watertight compartments. These items should be sufficient to indicate the manner in which she was built.

The question may be asked, "Why this class of work on a river boat which does not encounter heavy seas?" For one thing many of the designers come from salt water, and they will never rest until boats on the rivers are comparable to boats on the ocean. Achievement of this kind appears to have involved a hard struggle; but note the result. The ALPHA is without the customary hog-chains and toggles. These are unnecessary because her structure is built accordingly. Her fuel is carried in built-in tanks. The engine-room is arranged to give a maximum amount of space in which to work. She has the customary steel floor-plates, ladders and hand-rails. In a strong battle waged against the old type hand steering gear, to date, the die-hard old river men have won out. Hand steering gear is still used on many boats, but it will disappear with the rest of the antiquated gear reminiscent of the ROBERT E. LEE. The American Engineering Co., has developed a new type of river-boat power steering gear which promises to meet with favor.

To look at the ALPHA one would say "She is a sea-going job"; but a closer inspection reveals differences. The superstructure is made of steel. It is not as heavy as we find on seagoing vessels so it would not stand the buffeting of heavy weather at sea; no more would the frills on an old river steamer built of wood. But the cabins have no frills. They are substantial and clean-cut in appearance.

Approaching the question of maneuverability; she is a screw propeller boat and her bottom is almost flat, therefore she will turn quickly. She must turn quickly, and for this reason she has no less than six rudders; four ahead of the propellers and two back of them. It is said of her that, running at full speed, she can describe a figure eight crosswise of a stream 600 ft. wide.

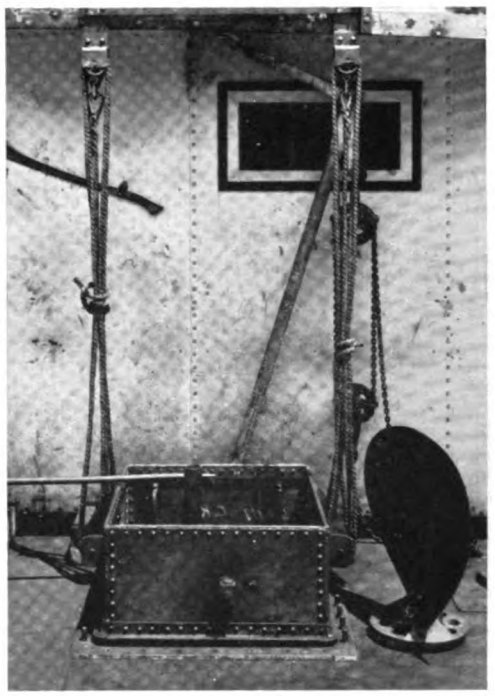
Compared with a stern-wheel steamer of similar power she is small. This very smallness makes her more adaptable to river work. It is difficult to kill the schooling of old river men. If for no other reason than a preponderance of precedent a steamboat must have a large crew. Not so with the motor-tug. There is but one man in the engine-room of the ALPHA, a thing unheard of on a steamboat of her size or power.

As yet we have omitted to describe her completely. Her dimensions are as follows:

Characteristics of Motor-tug Alpha

Length	85 ft. 6 in.
Beam molded	21 ft.
Draft	4 ft.
Depth molded	6 ft.
Displacement loaded	125 short tons
Gross tonnage	75 tons
Net tonnage	51 tons
Speed	12 miles per hour
Power in two engines	360 bhp.
Auxiliary generating set	20 kw.

Although the ALPHA is intended for day work only, she has a large after deck upon which could be built a cabin with ample accommodation for crew. At present there is a pair of large towing bits such as are used on ocean-tugs on this deck. The bow is fitted for pushing in the conventional river-boat style. This and many other well planned and worked out features very definitely places her in the river-boat category.



Propeller blade ready to install through air-lock, developed by Chas. Ward

It is not our intention to make it appear that the trend in river-boat design is to follow that of seagoing vessels. River motortugs are taking a very definite shape which should make them best suited to the districts and upon the waters for which they are built. Where seagoing standards are applied it is for the purpose of improving the staying qualities and to make in river craft construction a definite forward step. That a move such as this is necessary is indicated by the fact that but little improvement in river *steam boat* design has occurred in a period of fifty years. But the ALPHA is an example of the modern trend toward Diesel power. Her builders are to be commended for the important part they are playing in this development of efficient river craft.

Two New Ferries for Manhattan State Hospital Service

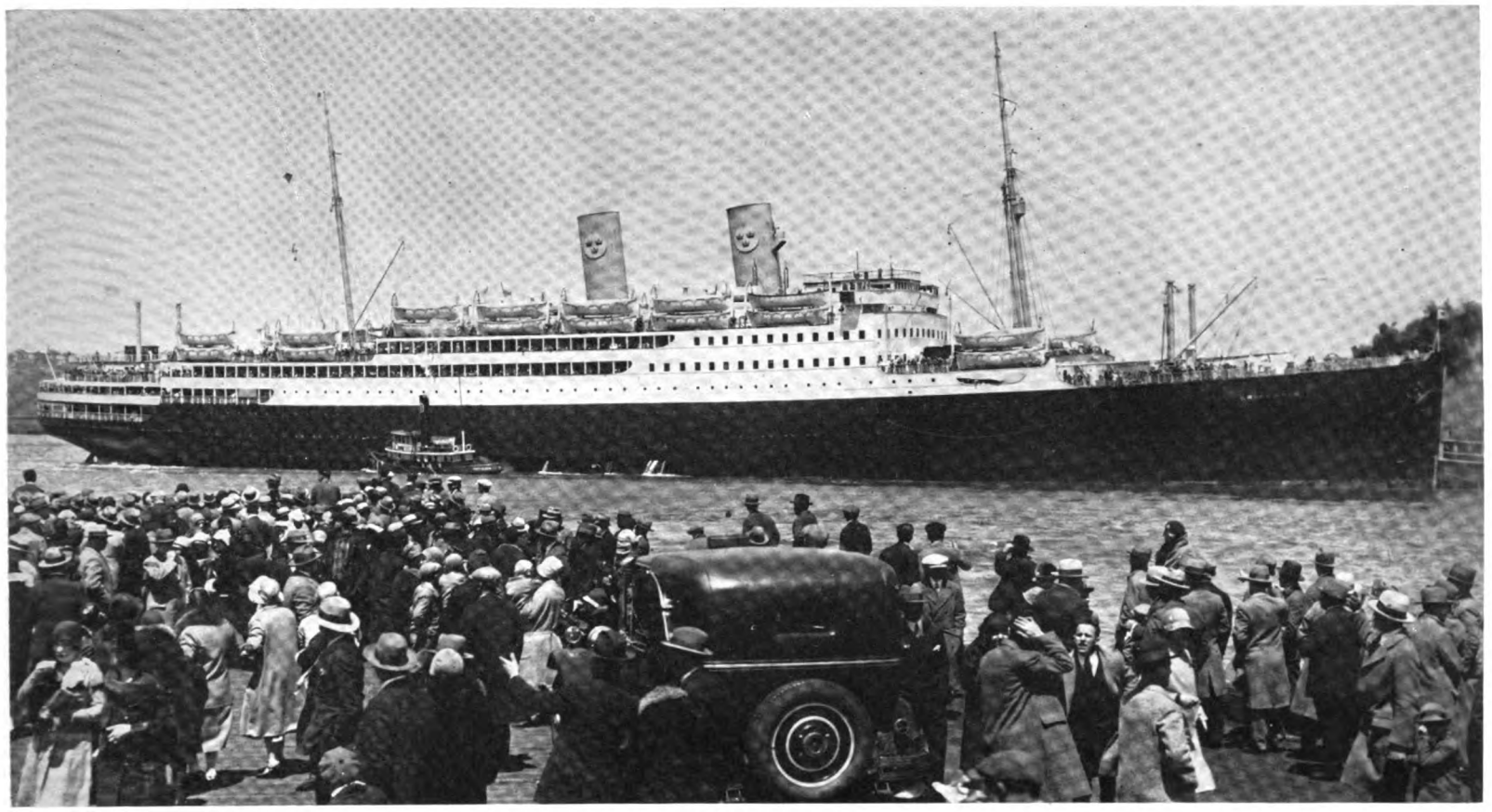
SPECIFICATIONS and contracts are being prepared by the Department of Public Works at Albany, N. Y., for two new Diesel-electric ferryboats approximately 115 ft. in length and 38 ft. beam. The propelling machinery for each boat will consist of two 250 b.hp. Diesel engines, directly connected to direct current, shunt-wound, separately excited generator, each with compound-wound exciter mounted on the same shaft. The generators are to be operated in series to funish current for the propelling motor, which will be of the shunt-wound separately excited double-armature type. Each will be designed for continuous rating of 400 s.hp., 500 volts, direct current (250 volts per armature) at 180 r.p.m. Excitation will be with 125 volts.

According to William M. Acheson, chief engineer, Division of Engineering, each engine will be of the six-cylinder, vertical single-acting four-cycle air or airless injection, non-reversing marine Diesel type. They are to be automatically governed as to speed and deliver continuously 250 b.hp. at the rated r.p.m. not exceeding 350 r.p.m. Each will drive a direct-connected, d. c. 160 kw. generator at 250 volts, and one d. c. 30 kw. exciter at 125 volts, at the operating speed. Each pair of engines is to be complete with one 40 cu. ft. free air, two-cyl. air compressor, direct connected to a 15 hp. 125 volt d. c. motor.

The control board is to be of heavy construction with separate panels mounted on an iron framework. The switchboard will be of dead front type.

Each boat will be designed for a speed of 12 statute miles per hour, and is to be fully equipped in accordance with the latest marine practice. Specifications call for steel hulls with four complete steel watertight bulkheads with watertight doors for access to each compartment. Two cabins, one on each side of the center driveway, will provide space for 300 passengers. Driveways will be designed to carry automobiles and motor trucks. The boats are to be used at the Manhattan State Hospital, Ward's Island, New York City.

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



GRIPSHOLM *leaves New York with A. C. Hardy aboard, to study her operation*

Twenty-second Voyage of a Pioneer Motorliner

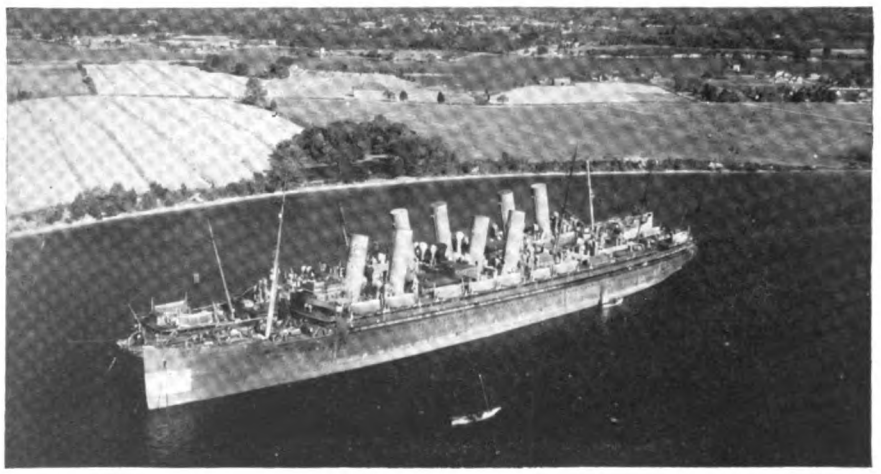
Maintenance of Strict Schedule of the Gripsholm—First Big Diesel-Driven Transatlantic Passenger Ship Proves Her Reliability and Popularity of "Ocean Motoring"

By A. C. Hardy, B.Sc.

At Sea on Board M.S. GRIPSHOLM, *May*, 1928

A REGULAR run of just over 3500 nautical miles with 4 days in port at other end, a regular sea speed of about 16.5 knots with her two big double-acting, four-cycle B. & W. Diesels turning at 125 r.p.m. is the present operating record of the big Swedish American motorliner GRIPSHOLM, now in her third years' service, and at the time of writing on Voyage number 22 eastbound, not counting two cruises to the Mediterranean. During the time which has elapsed since she made her maiden voyage, she has maintained a most rigid schedule and has never been delayed through any serious machinery trouble. In spite of this a great deal about the operation of big double-acting Diesels has been learned from the various problems which have come up for solution during the period of active life of the ship.

The knowledge obtained about foundation and seatings, for example, has been worked into the design of the new big motorliner KUNGSHOLM, completing at Hamburg for the same owner's Gothenburg-New York fast service. Big double-acting engines, in future ships, will be attached to the top of an especially strong, deep, double-bottom tank with their crank cases projecting, as it were, into the tank. This entirely supersedes the old idea of sitting the engine on girders built up on the top of the tank, and is considered by marine engineers to be very much more efficient.



Reconditioned and converted to Diesel power the MOUNT VERNON *and* MONTICELLO *will be as efficient and as speedy as any of the foreign built Transatlantic motorships*

The point to be emphasized here, however, is that the GRIPSHOLM throughout her period of successful operation has definitely proved the feasibility of the big passenger liner driven by high-powered, double-acting four-cycle Diesels. She was the pioneer ship for the Atlantic service designed by a school of thought which pins its faith to this type of motorship powering—a school of thought which has produced such ships as the ASTURIAS, ALCANTARA, CARNARVON, CASTLE, SATURNIA, VULCANIA, BURMUDA, ACCRA . . . and which is reported to be considering a ship of 100,000 hp. Credit must not be omitted, however, to the school of engineering thought which previously produced the quadruple-screw motor liner AORANGI in service on the Pacific for over three years.

From the passenger's point of view ships of the GRIPSHOLM type, and in particular the GRIPSHOLM herself, are attractive.

In addition to the novelty of "sea motoring" there is the lack of the peculiar

Generated on 2024-09-13 16:33 GMT / https://hdl.handle.net/2027/mdp.39
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

smell and dirt associated with the oil or coal burner and a great degree of comfort due to the large lofty public rooms made possible by Diesel power . . . these represent not the, perhaps, partisan opinions of the observer but the general opinions of disinterested passengers.

Furthermore, there is NO UNPLEASANT VIBRATION. It is necessary, perhaps, to stress this point in view of the rumors and opinions which seem to have been spread around concerning big motorships. Vibration there is, certainly, especially on the super structure decks above and abaft the main engines, but this is no greater than one experiences on many steam reciprocating engined ships. Forward of the main engines on and below the main deck all fore and aft there is scarcely any perceptible vibration. And remember that there are a great number of reciprocating parts in main and auxiliary machinery. It is interesting here to remark on the variations in pulsations, and what may be described as "shaking" pulsations with the rolling of the ship. These are particularly noticeable at night, but are not advanced as phenomena peculiar to motorliners only. They may be noted on any reciprocating-engined ships with superstructure.

The problem of muffling, too, has been very successfully solved. Except when one's ear is close up to the casing containing the main engine mufflers there is no perceptible noise other than the faint pulsations common to any ship with reciprocating machinery. Even near the muffler casing the noise is not unpleasant. On the boat deck there is complete silence. The absence of anything in the nature of a smoky exhaust is particularly noticeable both from main and from auxiliary engines. The fact that the galley-fires exhaust into aft funnel, and the heating boilers have uptakes leading into the forward funnel gives use at times to a certain haze over the tops of the stacks. The origin is, however, obvious!

Worthy of special note on the GRIPSHOLM is the clean and spotless appearance of the engine room. This compares more than favorably with the engine rooms of other big passenger liners of similar type which the author has inspected in detail.

The prevailing light green color—not found on other similar ships may have a great deal to do with the cleanliness. It is almost standard color in Scandinavian motorships. Incidentally some one once suggested that the cleanliness and general aspect of motor engine rooms varied directly with the type of accommodation provided for the engineers. On the GRIPSHOLM and on the converted Shipping Board motorships the standard is a high one. This is worth more than a thought to shipowners.

It has often been suggested in defence of the large type of motorship fitted with double-acting Diesels that chief engineers dislike maneuvering out of a dock or pier. In truth, engines of the GRIPSHOLM type are no small pieces of mechanism to put through rapid maneuvers ahead and astern.

To state, from personal observation at the control platform, that GRIPSHOLM answers bells coming out of her New York slip like any of the puffing towboats pushing her nose round is no exaggeration. "Half astern both"—"Stop port"—"Full astern starboard"—"Half astern both"—"Full astern starboard" and "Half ahead port"—"Stop both"—"Slow ahead both"—"Half ahead both"—and there she is "Full away" until the pilot is dropped outside Ambrose Channel.

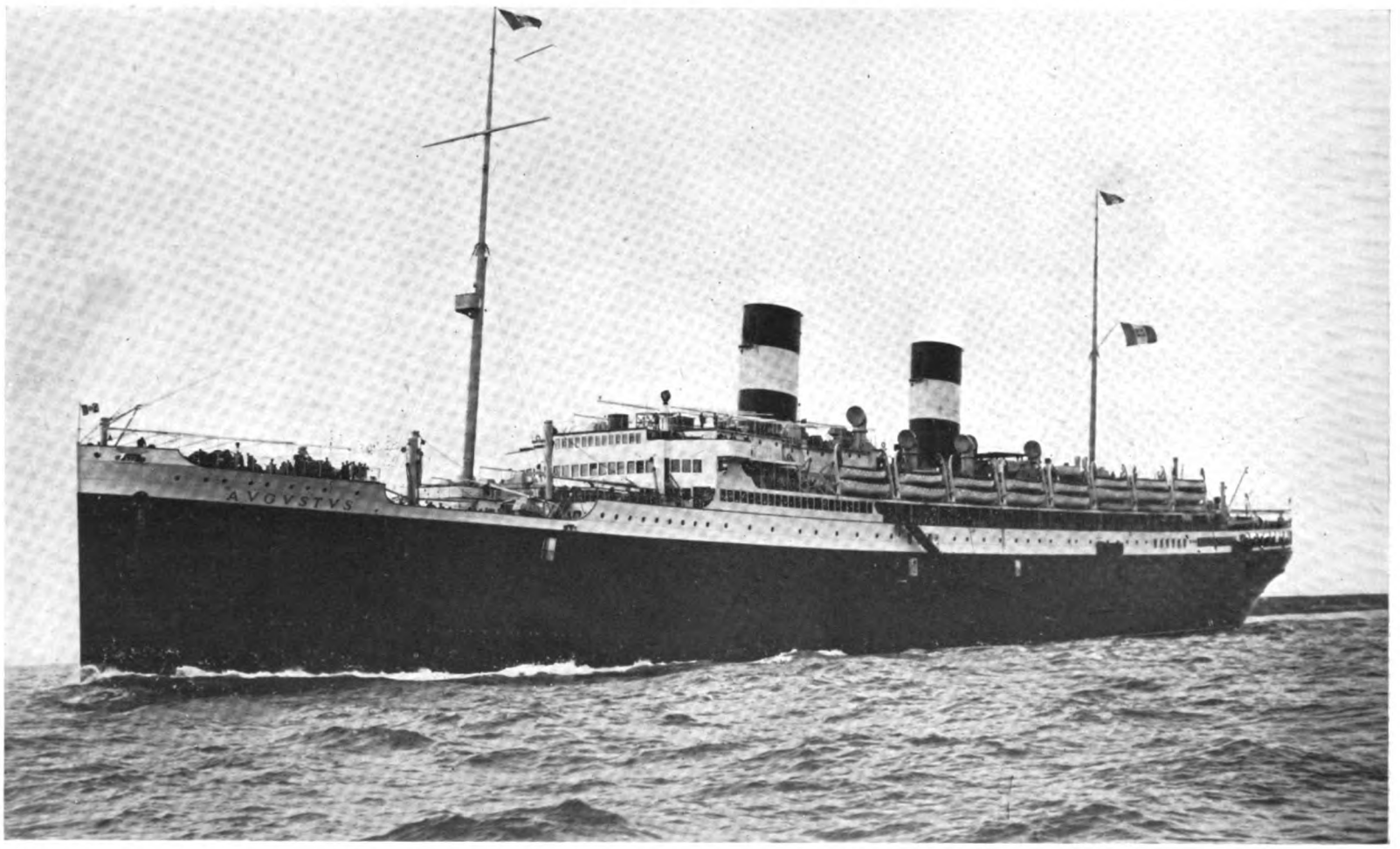
It is perhaps wise to emphasize this in order to correct some of the erroneous impressions of motorliner speeds which are in circulation. A speed of between 16 and 17 knots is a regular running speed for most passenger ships of GRIPSHOLM size and type—steam or Diesel. Supercharging has accomplished a certain speeding up with the SATURNIA.. She is one of the highest powered double-acting 4-cycle liners yet completed and is commonly reported to have

SIZE AND POWERS OF GRIPSHOLM-TYPE PASSENGER LINERS

(Double-acting Diesel Engines)

Name	Gross Tons	Total Power I.hp.	Cyls. Per Engine	R.p.m.	Diam. Ins.	Stroke Ins.	Remarks
Gripsholm	17300	13750	6	125	33.07	59.05	Separate comprs.
Asturias	22500	15000	8	115	33.07	59.05	Attached comprs.
Accra	9336	.....	6	110	33.07	59.05	Attached comprs.
Carnarvon Castle ..	20000	20000	8	117	33.07	59.05	Attached comprs.
Saturnia	23500	24000	8	125	33.07	59.05	Supercharge
Kungsholm	18000	18000	8	100	33.07	59.05	Separate comprs.

Building: One liner of Adriatic type for White Star Line; one sistership to Carnarvon Castle; one intermediate liner per Union Castle Line; one sistership to Saturnia.



AUGUSTUS, *world's largest and fastest Diesel-engined motorliner shortly goes into New York-Italy service. Conversion of the* MOUNT VERNON *and* MONTICELLO *to Diesel power will give the United States Lines two equally fine, fast, efficient Transatlantic motorliners. European shipowners have almost ceased to build steamships.*

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

made 21 knots on trial. (The AUGUSTUS is a higher powered motorliner, but she has a different design of double-acting Diesel engine. Her speed is about 20 knots).

In assessing good running speeds to ships and engines much valuable data on propellers for these big twin-screw ships has been obtained. Here, again, experience from the GRIPSHOLM has helped considerably.

In embarking on construction of the KUNGSHOLM, therefore, and of any new similar construction, owners will feel that they are sailing on well charted seas. The work of the GRIPSHOLM—as a pioneer ship or as a laboratory ship—call her what you will—should not be forgotten.

Also it should be remembered that big passenger liners, like the GRIPSHOLM, are beginning to have an important psychological effect upon passenger travel: Passengers like to travel in these new automobiles of the sea because they are clean and—this is an important point—because they don't smell. Passenger liner companies who own and operate motorships have a distinct pull over their competitors from this point of view. They should lose no opportunity in exploiting it to the fullest extent. Look how the BERMUDA has been exploited, and increased the travel to those delightful semi-tropical islands—the Bermudas!

Log of motorliner GRIPSHOLM, Eastbound, May, 1928, Voyage No. 22 B.

Date	Latitude	Longitude	Distance	Aver. Speed
13/5	N 40°24	W 65°55	385.0	16.66
14/5	N 41°37	W 57°13	401.0	16.90
15/5	N 43°34	W 48°49	389.0	16.60
16/5	N 47°37	W 41°44	385.0	16.41
17/5	N 51°32	W 33°49	387.0	16.50
18/5	N 54°52	W 24°18	395.0	16.90
19/5	N 57°32	W 13°52	383.0	16.42
20/5	N 58°36	W1° 58	385.0	16.63
21/5	N 57°50	E 10°7	387.0	16.88
21/5			61.0	
		Total miles =	3558.0	

Passed Ambrose Lv. May 12th at 18 hours 22 m. G. M. T.

Passed Skaw Lv. May 21st at 12 hours 10 m. G. M. T.

Time = 209 hrs. 48 m.
Distance, 3493 miles.
Average speed = 16.65 knots.

The bridge doesn't spare the men at the controls, but the navigators are careful of their orders because they know from experience that all motorships are so quick on the telegraph. And as a matter of fact there is less fuss at the controls of a large passenger motorliner of GRIPSHOLM type than with a big turbine ship—two men at the starting-air bottle valves; one man at each main engine control — reverse gear and fuel pump levers. The engines pick up on fuel splendidly.

Leaving New York on Saturday, the GRIPSHOLM when on a straight run across not calling at Halifax, N. S., arrives in Gothenburg on the following Monday week in the afternoon. She makes runs of between 390 and 400 miles per day and her *average* running speed is easily in excess of 16 knots.

The new KUNGSHOLM is expected to make 17 knots running speed under average running conditions at sea.

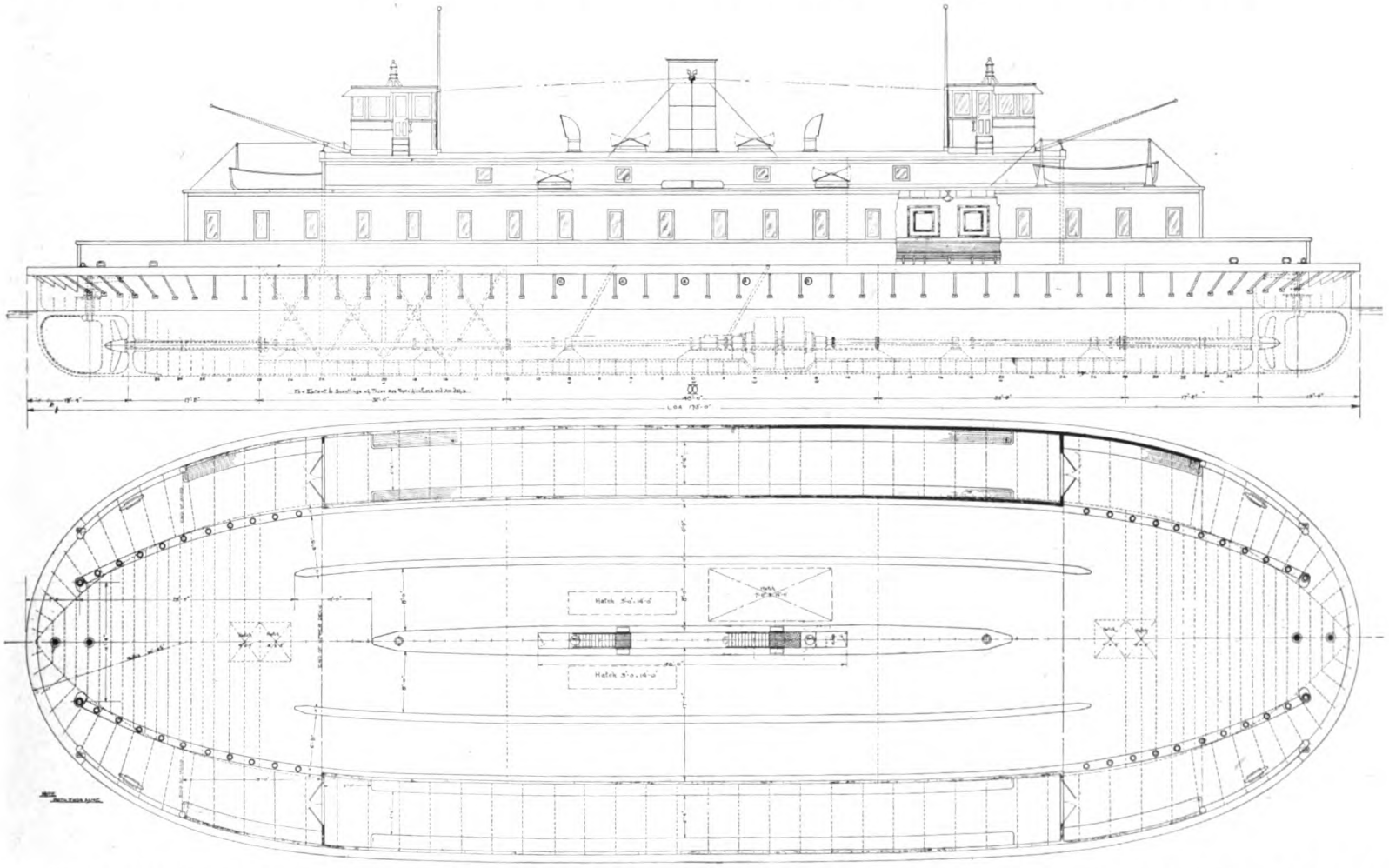
Norfolk Diesel-Electric Ferry Engines Ordered

The order for the Diesel ferry engines for the Norfolk County Ferries, Portsmouth, Va., has gone to the Bessemer Gas Engine Co., Grove City, Pa. The dimensions of this steel boat will be as follows:

Length over all	173 ft. 0 in.
Length b. p.	146 ft. 6 in.
Beam over all	57 ft. 0 in.
Beam of hull at deck	37 ft. 0 in.
Depth moulded	14 ft. 0 in.
Draft	8 ft. 6 in.

The power plant will consist of two 400 b. hp. Bessemer Diesel engines connected to two General Electric 270 k.w. generators which will furnish current to one 670 b.hp. double armature motor on through shafting, with propeller at each end.

The Mitsui Kisen Kaisha announces through its San Francisco office that it is adding three motorliners to its fleet for trans-Pacific service, due to the great increase in east-and-west-bound passenger travel. The first will be the SHIGSAN MARU, 9,000 tons, recently purchased in England. This vessel is three years old and has a sea speed of 11 knots. Two other motorliners are now nearing completion in the Tama yard at Kobe for the Mitsui Line, according to the San Francisco statement. These are of 9,800 dwt., and will have a speed of 14.5 knots. Cost of the two vessels is placed at $850,000 each. The Mitsui company now operates from Kobe and Yohohoma to San Francisco, Seattle, Portland, and Wilmington, Del.



Profile and plan of the two new Bessemer-G. E. Diesel-electric ferries now being built to plans prepared by Eads Johnson for the Norfolk County ferry system.

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Problems of Diesel Engine Selection

The Service in Which the Vessel Will Be Engaged and Sound Engineering Are Pivotal Points in the Choice of a Marine Plant

By Consulting Engineer

ONCE a shipowner and his engineering advisers have banished the idea of steam power for a new ship, the matter of engine selection may not seem to be an easy one, because there is a large variety of Diesel types from which the selection must be made. On all sides the prospective motorship owner is bombarded by the claims of the oil-engine salesmen extolling the merits of 2-cycle, 4-cycle, single-acting, double-acting, opposed-piston, airless-injection, air-injection, high piston speed, low-piston speed, gear-drive, electric-drive, trunk-piston, cross-head design, etc., all of which types are in service at sea giving excellent reliability.

In the last few words the shipowner may find in the final reckoning one answer to his problem. For any well-designed Diesel engine built and put on the market by an engineering company of repute and experience will be found to be a good engine. In other words, if the owner goes to any responsible oil-engine organization in this country whose reputation is established he is going to get an engine that will stand up to the work of propelling his ship, even in a more reliable manner than the marine steam-engine and boiler plant to which he has been accustomed for years.

"Even so," remarks the owner, "just how shall I make the selection from the 57 varieties offered me? The MOTORSHIP MANUAL, for instance, classes Diesel marine engines as follows, and to this classification I have added the V-type four-cycle engine:

Classes of Marine Oil Engines

4-CYCLE	SINGLE-ACTING	*Trunk piston*	*Air injection*	*Diesel*
			Airless injection	*Diesel*
				Hot surface ignition
		Crosshead	*Air injection*	*Diesel*
			Airless injection	*Diesel*
				Hot surface ignition
	DOUBLE-ACTING V-CYL. ARRANGEMENT	*Crosshead*	*Air injection*	*Diesel*
			Airless injection	*Diesel*
		Trunk piston	*Airless injection*	*Diesel*
2-CYCLE		*Trunk piston*	*Air injection*	*Diesel*
			Airless injection	*Diesel*
				Hot surface ignition
		Crosshead	*Air injection*	*Diesel*
			Airless injection	*Diesel*
				Hot surface ignition
	DOUBLE-ACTING	*Crosshead* / *Sliding cylinder*	*Air injection*	*Diesel*
	OPPOSED PISTON	*One crank per cylinder*	*Air injection*	*Diesel*
		Three cranks per cylinder	*Airless injection*	*Surface ignition*

"Here are outlined enough different designs almost to bewilder me as an owner without first-hand experience of any of these types. Just what shall be my guiding factor?"

The ship herself and the service in which she will be engaged are the pivotal points on which to base the selection. Wrapped up in the ship and her work, and embodied in her design, are the engine-room, its machinery, and the cost of the entire job.

Consequently, the simplest plan for engine selection is to enumerate the main points, namely:

1. Class of Vessel and Service.
2. Voyage length and Net-Cargo Capacity.
3. Twin or Single Screw.
4. Propeller speed and engine speed.
5. Maximum desirable machinery length.
6. Maximum desirable machinery height and width.
7. Maximum desirable machinery weight.
8. Good Sound Engineering.
9. Engine Balance.
10. Accessibility and Maneuverability.
11. Fuel consumption.
12. Maximum Cost Economically Permissible.

Reliability and durability should be eliminated from this particular comparison, because we already have accepted the premise that only reputable, well-known engines are being discussed, the reliability and durability of which have been established over periods of operation in marine and land service. Freak designs, and experimental types are not being discussed.

"Just where shall the line be drawn between trunk-piston and cross-head types and between single-acting and double-acting types?" The answer to the first mentioned is largely answered in the limitation of factors Nos. 1, 5, 7 and 12. The art of Diesel construction has made such rapid progress during the last few years that for certain types of vessels trunk-piston construction is very satisfactory, and preferable, up to about 3,000 b.hp. per engine, and possibly over within certain revolution limitations. Where headroom, light weight and low first cost are the main considerations, fuel and lubricating oil consumptions are secondary—provided they do not vary too greatly. With a big, slow-speed engine, cross-heads are, of course, highly desirable and advisable. But, good, sound engineering always is very essential.

The problem of selecting single-acting or double-acting engines may be solved if the owner bases his decision on points, at least where engines up to 5,000 s.hp. are involved, as follows:

	Points
Good Engineering	25
Overall length	20
Weight	20
First Cost	15
Accessibility	10
Height	5
Fuel and Oil Consumption	5
Total	100

These points should be modified with varying type of vessels and for special service.

Vibration also need not be included, as vibration being so dependent on the design and construction of the ship, her engine foundations, the auxiliaries, and the amount of power for a given hull construction, that it is a matter more for the naval architect than for the engine builder, because the modern Diesel engine is well-balanced as a power unit before it leaves the shop. With a two-cycle engine good balance can always be secured from four cylinders, and from six cylinders with the four-cycle type. More cylinders are optional

In between the single and double-acting designs comes the opposed piston engine, the performance of which in service has fully justified its existence and present position in the marine world. So far its construction has mainly been restricted to big cross-head engines of 70 to 130 r.p.m., although a few higher speed engines have been placed in service showing that the design is not limited to slow speed. The same points, one to twelve, can well apply when making a comparison with other types. This also is largely the case when arriving at a decision over direct, electric or gear drives. Considerations and personal prejudice as a rule are in actual practice the decisive factors in making a choice of engine—not a wise policy.

It would be idle to say that all motorships without exceptions have been completely successful, but in nearly every comparatively rare case of serious trouble or failure, the difficulties encountered could be traced to rash claims for an untried design, to poor operation, or to a short-sighted policy of the owner, or his "expert" adviser, who insisted on buying a marine oil-engine power-plant solely upon a price basis. When first cost is the prime consideration with a shipowner he generally winds up by forcing the price level below the point at which a good Diesel engine can be built commercially. Or, he is beguiled into underpowering his ship. He throws away months of expert studying and weighing of engineering fundamentals and pays more in the end. An engineering study of Diesel designs is time and money wasted, if price be the determining factor.

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Interesting News and Notes From Everywhere

American-Hawaiian Steamship Company plans to build four or six new ships.

Two small motorships for the Canary Islands' fruit trade were recently launched by Euskalduna Shipbuilding plant, Spain.

The Ocean Trawling Company of Boston have placed an order for a Diesel-driven trawler with the New London Ship & Engine Company.

There are now under construction for Boston and Gloucester fishing-vessel owners eight Diesel-driven trawlers, and four more are now being planned.

According to a French shipping authority, the recent boiler explosion on the high-pressure turbine vessel KING GEORGE V, is a setback to high-pressure steam now being adopted in the endeavor to meet the economies of Diesel power.

KING WILLIAM, last of a series of nine Diesel freighters ordered from Harland & Wolff for the Kine Line Ltd., was launched during May. She is a 400 ft. vessel powered with a 6-cylinder, 4-cycle single-acting Harland-B. & W. Diesel engine.

A French shipowner has found by experience that the running expenses, including capital and overhead charges, of his motorship was the same as that of his steamer, but the Diesel vessel carries 1000 tons more cargo per voyage. In other words, he has a much larger ship for his money. Think that over!

Since the reorganization a year ago, officers of The Pusey and Jones Corporation, shipbuilders, have been formulating plans for general improvements throughout the plant, with particular attention given to the marine department. Contracts have recently been let for several new buildings which will replace obsolete structures rather than increase the size of the plant. Tools and machinery of high efficiency will be installed and the work routed in a straighter line than is possible with the existing layout.

A 12 ft. model of the new passenger motorliner, KUNGSHOLM, of the Swedish American Line, built for traffic between New York and Gothenburg, is being exhibited at the Company's offices at 21 State Street, New York. It is an exact replica of the ship, even to the minutest exterior details. The KUNGSHOLM will make her maiden voyage from New York to Gothenburg, on December 8th.

One of the largest motorships yet built in Sweden is the 12,300 tons d.w. tanker recently launched at the Kockums yard, and which is having twin 1750 i.hp. Kockums-M.A.N., two-cycle Diesel engines installed.

Three new motorships for the Civitavecchia-Sardinia Line, building at Ansaldo's shipyard in Genoa, will have a speed of 15½ knots. Their loaded displacement will be 3900 tons and the power 3700 i.hp.

The Oceanic Steamship Company of the Matson Navigation Lines plans to construct two new 18-knot combination passenger and cargo motorliners, and will borrow money from the U. S. Ship Loan Fund for the purpose.

"Our experience of operating motorships to and from many parts of the world has satisfied us as to their suitability and adaptability for a large number of trades," —*Lord Kylsant, at the annual meeting of the Royal Mail Steam Packet Co.*

ASAMA MARU, and TATSULA MARU are the names of the three 16,500 tons motorliners building at the Mitsubishi shipyard for the Nippon Yosen Kaishi. The sister vessel under construction at the Yokohama yard has been named CHICHIBU MARU.

Using superheated steam at a pressure of 260 lb. the new 2160 i.hp. quadruple-expansion steamer RIO DIAMENTI, at sea after trials, had a fuel consumption of 22 tons per day at 11.53 knots. A Diesel ship of 2300 i.hp. (the equivalent power) would burn only 8 tons per day for the same average speed and would carry from 350 to 750 tons more cargo, according to voyage length.

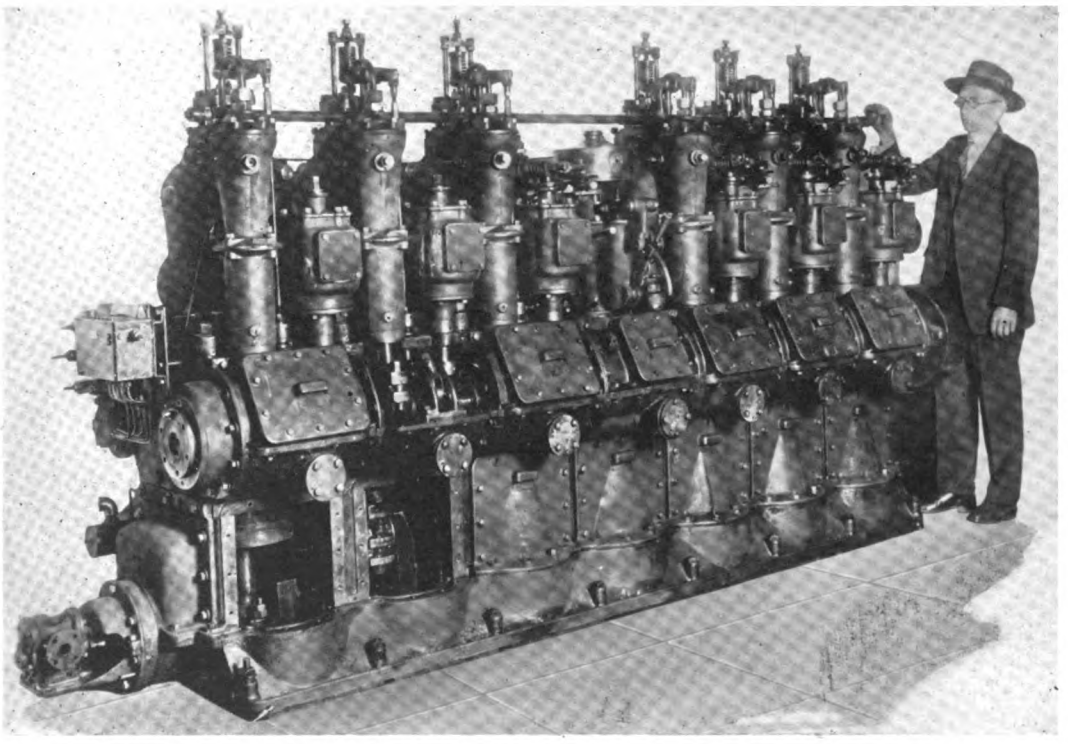
Danton & Russell, manager of the Portland Steamship Line, Portland, Ore., plan a number of new 16-knot cargo ships and will borrow from the U. S. Ship Loan Fund for that purpose.

It is expected that the Shipping Board freighter DEFIANCE will have her Diesel electric drive conversion installation completed by January 15th next, and trials are due to be run immediately after at the Norfolk Navy Yard.

The Royal Mail Packet Line interests now own 500 ships aggregating 2,700,000 tons. In 1927 the Royal Mail carried 1,369,000 passengers and 13,986,000 tons of cargo. What America needs is a privately-owned motorship fleet of this size!

The Standard Oil Co. of New York has just taken delivery of the Diesel-driven lighter UTAH built for this oil company at the Kowloon yard of W. S. Bailey & Co., Ltd. This craft is 88½ ft. long, 18 ft. breadth and of 80 tons capacity. A 3-cylinder, 105 s. hp. Benz engine drives her at 7½ knots.

We are enabled to give the first illustration to be published of a Diesel engine which has been under development for some years at the Climax Engineering Works, Clinton, Iowa, under the direction of Norman McCarty. It is a two-cycle, single-acting, supercharged, six-cylinder machine with "hot air" injection, there being a separate compressor to each cylinder and the high-stage air compressor injects the fuel into the cylinder thru a port without any intercooler. There are six cylinders, 7½" x 10", and 300 b.hp. is developed at 600 r.p.m. with a m.e.p. of 75 lbs. and a m.i.p. of 110 lbs. on a weight of 40 lbs. per b.hp. The overall length is 9' 6" x 32" width and the height 5' 6" to the center of the shaft. The fuel consumption is 0.48 lb. per b.hp. and 0.323 lb. per i.hp. The engine was designed for mass production, with auxiliaries for motorships and Diesel-electric locomotives in view.



Climax hot-air injection marine Diesel engine, now completed, at Clinton, Iowa

The 474 ft. motortanker HALLANGER has recently completed successful trials conducted by the Netherland Shipbuilding Co., Amsterdam, Holland, who built her to the account of Norwegian owners. Her propelling engines are two Werkspoor four-cycle Diesels, which

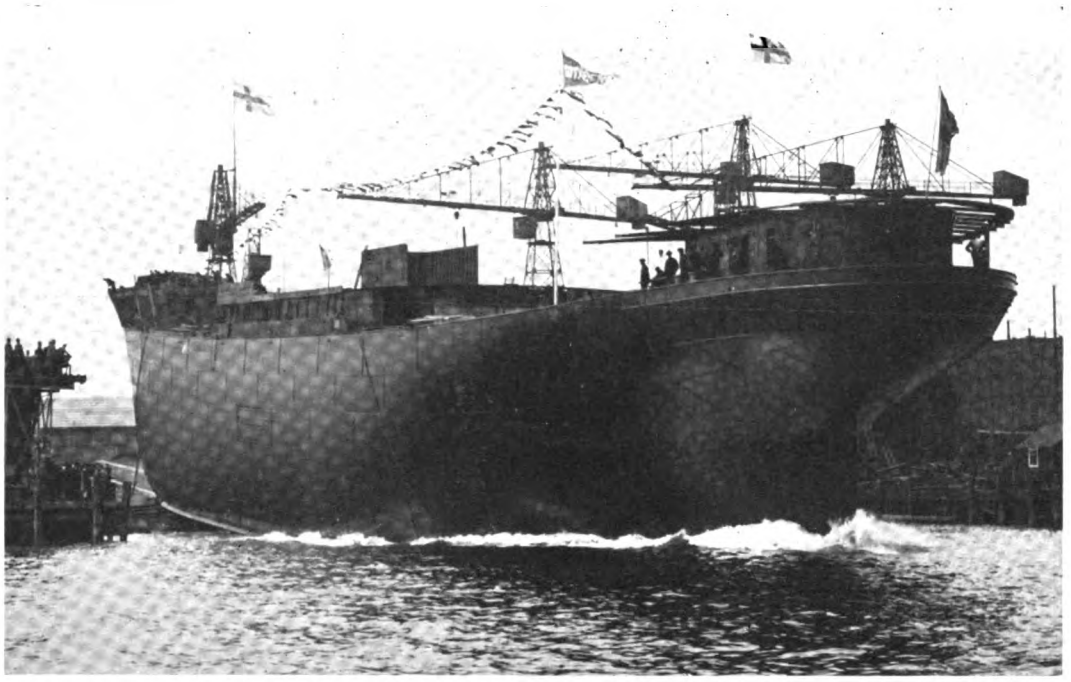
Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

News and Notes

(*Continued*)

give her a sea speed of 11 knots.

All the four new 13,000 tons Diesel freighters for the Shaw-Savill & Albion Co., Ltd., a White Star Line subsidiary — will have service speeds of 15 knots. They will operate from Great Britain to New Zealand, and are the World's largest general cargo boats. America needs many such fast cargo liners for her overseas trade.



Launching of the 14½*-knot passenger-cargo motorship* MARGARET JOHNSON *at the Gotaverken*

According to Representative Britten, Chairman of the House Naval Affairs Committee, the naval bill, which calls for the construction of 15 airplane cruisers and one airplane carrier at a cost of $274,000,000, will be overwhelmingly passed by Congress. We hope that Mr. Britten's prediction proves to be a true prophecy and that the work is let to private shipyards.

On May 1, 1928, the total number of motorships under construction or on order to be equipped with Diesel engines of the Burmeister & Wain type was as follows:

118 ships with total	.....	611,219 i.hp.
total deadweight capacity		891,392 tons.
total gross tonnage	....	755,149 tons.
displacement	.....	1,454,769 tons.

In addition hereto 101,691 i.hp. of B. & W. marine Diesel engines used for submarines and ship's auxiliary purposes, etc., are under construction or on order.

"After reading a Marine Section News Letter of the National Safety Council there are two obvious facts," remarks a reader. "The organization intends to do some excellent work and has named almost every possible marine hazard to life and limb. The work is constructive in intent; but gives an impression of being unable to see the forest for the trees. Too many faults have been found where no faults exist. A careful study of this News Letter from the angle of the crew would indicate that a National Safety Council representative would be as welcome aboard ship as would be another efficiency expect in his own office. A two-fistd mate, a good chief engineer, and a hard-boiled skipper—and there are still many left—will prevent more unnecessary accidents than any number of thousands of words written by men who do not appear to understand how great can be the antagonism produced."

On June 1, 1928, there were a total of 42 large tankers under construction aggregating 428,100 tons d.w. Of these vessels only six, totaling 54,000 tons d.w., are being steam driven, all the rest being Diesel driven. The motorships number 36, aggregating 374,100 tons d.w.c.

"When the MOUNT VERNON and MONTICELLO are reconditioned"—says Vice-Chairman Plummer of the Shipping Board—"the United States Lines will have a well-balanced fleet to offer for sale to American shipowners. These ships are in excellent shape and will be capable of 15 years' additional service. When reconditioned they will have a cruising speed of 21 knots and will constitute fast vessels comparable with the LEVIATHAN, which has a cruising speed of approximately 23 knots—although capable of greater speed. In addition to the LEVIATHAN the United States Lines own the GEORGE WASHINGTON, 17 knots speed; PRESIDENT HARDING, 17 knots; PRESIDENT ROOSEVELT, 17 knots; AMERICA, 16 knots and the REPUBLIC, 13¾ knots. They are primary passenger liners, but also handle mail and freight on the North Atlantic route."

As these ships will take from 18 months to 2 years to convert to Diesel power it is to be hoped that calling the bids and placing the contracts for the work will be carried out as speedily as possible. Congress has appropriated the $12,000,000 necessary, and the Act has been signed by President Coolidge. The fleet is badly in need of them, and Diesel drive is the most economical form of power to install, even though the first cost will be somewhat higher than steam power.

Reconditioning of the French cargo motorship BRAZZA, to a passenger accommodation, it will be recalled took place last year, and she has been placed in regular service on the West Africa line. Her popularity has prompted the owners to send her on a special summer cruise. On August 20th of this year she will leave Marseilles and visit Barcelona, Palma de Majorca, Algiers, Tangier and Lisbon, returning to Bordeaux on September 1st. The BRAZZA has a displacement of 18,000 tons, and is powered with two Sulzer engines giving a total of 5400 i.hp. The reconditioning was carried out by Chantier et Ateliers de St. Nazaire-Penhoët.

Activity at the Blainville yard of the Chanters Navals Francais has partly resulted from work on two 11,600 tons d.w. motortankers building to the account of the Russian Soviet Naphtha Syndicate. These vessels are both being fitted with twin Sulzer Diesel engines of 2500 b.hp.

The combination cargo - passenger motorship ASSIRIA has just been completed at the Stabilimento Tecnico Tristino at San Rocco, Italy. This vessel, intended for the Near Eastern service, measures 300 ft. by 42 ft. by 23 ft. 4 in., is of 3000 tons gross. She is powered with one 2160 h.p. Technico-B. & W. type Diesel engine, giving her a sea speed of 13½ knots.

"The great weakness of government ownership is that it will not supply such organizations; it has too strong a tendency to curb and suppress individual initiative, to hamper and hamstring endeavor with laws and rules and regulations. The advantage of private ownership—and this applies with particular force to a business as hazardous as that of shipping—is that it inspires and rewards individual effort; it encourages initiative and freedom of thought; it supplies the necessary incentive to that kind of courageous and persistent endeavor whose success transcends private boundaries to bring great public benefit." —*Roger D. Lapham, president, American-Hawaiian Steamship Co.*

Announcement was made June 11, by Harry S. New, Postmaster General, that bids will be opened July 9th for five new mail contracts under the terms of the 1928 Merchant Marine Act. Proposal blanks are now available at the Department. The contracts call for carrying mail over a period of ten years, beginning August first. A bond of $100,000 must accompany contracts on all routes excepting one which was set at $10,000. The Postmaster General reserves the right to reserve or reject any or all bids.

The five routes just advertised are those which the Postmaster General sent to the Shipping Board recently for approval and which were approved by the latter. Contracts will shortly be offered for additional routes.

A report from Washington states that the present rate of pay for engineers on Shipping Board motorships will remain in effect another year. An agreement to this effect was reached during the annual conference between representatives of the National M.E.B.A. the Shipping Board and the Merchant Fleet Corporation.

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Auxiliary Diesel Yacht Cressida

Details of a New Vessel of Topsail Schooner Type Powered by a 250 Hp. Diesel, and Suitable for Ocean Cruising

THE new auxiliary Diesel yacht CRESSIDA designed by Cox & Stevens, Inc., for Hermann Oelrichs, has just been completed, and, incidentally, has entered the race sponsored by the King of Spain. Wireless bulletins from her captain indicate that she is an admirable seaboat and fast under sail and power.

Principal Dimensions of the CRESSIDA

Length o. a.	172 ft. 0 in.
Length w. l.	125 ft. 0 in.
Beam	28 ft. 0 in.
Draft	17 ft. 0 in.

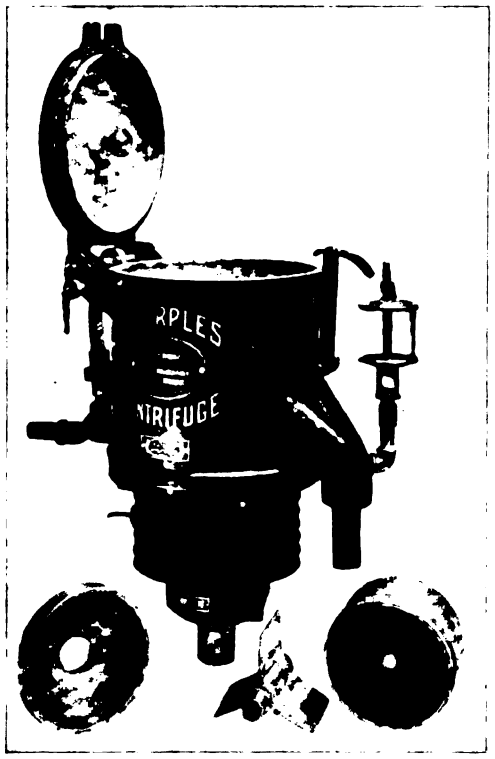
CRESSIDA has a 250 hp. Diesel for propulsion. There are two Diesel driven generators, one of 18 kw. and one of 10 kw. capacity, which supply electricity for all auxiliaries such as compressors, refrigerating plant, hot water heating plant, forced ventilating system, pumps, boat hoists, deck winches and anchor handling gear. The vessel is capable of a cruising speed of 9 knots with the engine installed. Fuel oil, fresh water and food storage capacity has been arranged to provide a cruising radius of 4,000 miles with a crew of 23 men, the owner and guests.

The yacht's rig is that of a topsail schooner. There is a raised forecastle giving a high seagoing bow, and a quarter deck aft —the sheer being unbroken. A steel house on the main deck contains the chart room and navigating instruments, while at the break of the quarter deck there is a steel companion housing a gyro compass. Across the after end of the top gallant forecastle is a low navigating bridge for use when the vessel is under power. The main deck is clear except for the small house amidships. The quarter deck is also free from obstructions, there being a roomy cockpit for use under sail, as well as space for deck furniture.

The owner's quarters, situated on the berth deck aft, consist of a library off of which open two owner's rooms each with a bath, three large guest rooms and two additional baths. The dining saloon is placed amidships and is reached from the pantry by a passage on the port side of the engine casing. A valet's room, pressing room and spare stateroom open off this passage. The galley is just forward of the engine casing and adjoins the pantry and officers' messroom. Forward of the messroom are the radio room and officers' quarters. A ladder at the end of the passage leads into the forecastle which contains the crew's quarters and messroom. Below decks there are large cold storage compartments, rooms for dry stores and a trunk room.

A Small Centrifuge of Advanced Design

A NEW type of centrifuge for purifying fuel and lubricating oil for small Diesel engines has been placed on the market by the Sharples Specialty Co. The fuel oil capacity is 15-25 gallons per hour and for lubricating oil 15-20 gallons per hour.



Compactness and simplicity are special feature of this design

The bowl has but three parts; the shell top and three-wing element. The diameter is four and one-half inches, length three inches and weight four pounds. It has a dirt holding capacity of 26 cu. in. or one and one-half pounds. The machine complete with 1/5 h.p. motor drive weighs 66 pounds. The extreme dimensions are height 17¾ in. and width, with hinged cover lifted for cleaning, 14⅜ in.

Arrangement is made for mounting on wall or engine frame. Motors are supplied to use 32, 115 and 230 volt d.c. and 110 and 220 volt single phase 60 cycle a.c.

A gasket joint under the bowl cover makes it gas tight which presents the escape of oil vapors. The dirty oil supply and clean oil delivery pipes may be permanently connected, since their removal is not necessary when cleaning the bowl.

The motor is mounted directly under the bowl. Its housing has cooling veins intended to carry off heat generated in operation. Leads are conveniently arranged for connection to the supply of current.

This machine promises to meet an increasing demand for a high grade, small, light centrifuge suitable for use in Diesel engine plants of small power. It should be noted that its capacity is comparable to that of older type centrifuges of considerably larger dimension and weight.

Two New Atlas Diesels

TWO models of small Diesels are announced by the Atlas-Imperial Diesel Engine Company, of Oakland, California. Both are known as "Diesel Junior," and are of the mechanical injection type, of the same design as the larger Atlas-Imperials. They are intended primarily for use in small workboats, towboats, and fishing craft, with cost cut down to little more than that of the gasoline engine of the same power. The smaller is of 20 hp., two-cylinder, marine type, with 6½ in. bore and 8½ in. stroke. The larger is of 30 hp., three-cylinders, with 6½ in. bore and 8½ in. stroke.

Two New Dollar Line Ships

As stated in our June issue, R. Stanley Dollar wired us as we closed for press that plans for the Dollar Line ships were not then fully formulated. Our San Francisco correspondent since writes that two new motorliners, to cost $30,000,000 or thereabouts, are to be constructed immediately by the Dollar Steamship Company, according to a statement issued on June 1 by R. Stanley Dollar, vice-president of the corporation, at San Francisco. Construction of these liners is the direct result of the passage of the Jones-White bill, Mr. Dollar said, adding that "the American public should be appreciative of what President Coolidge and the Congress have done for the American merchant marine."

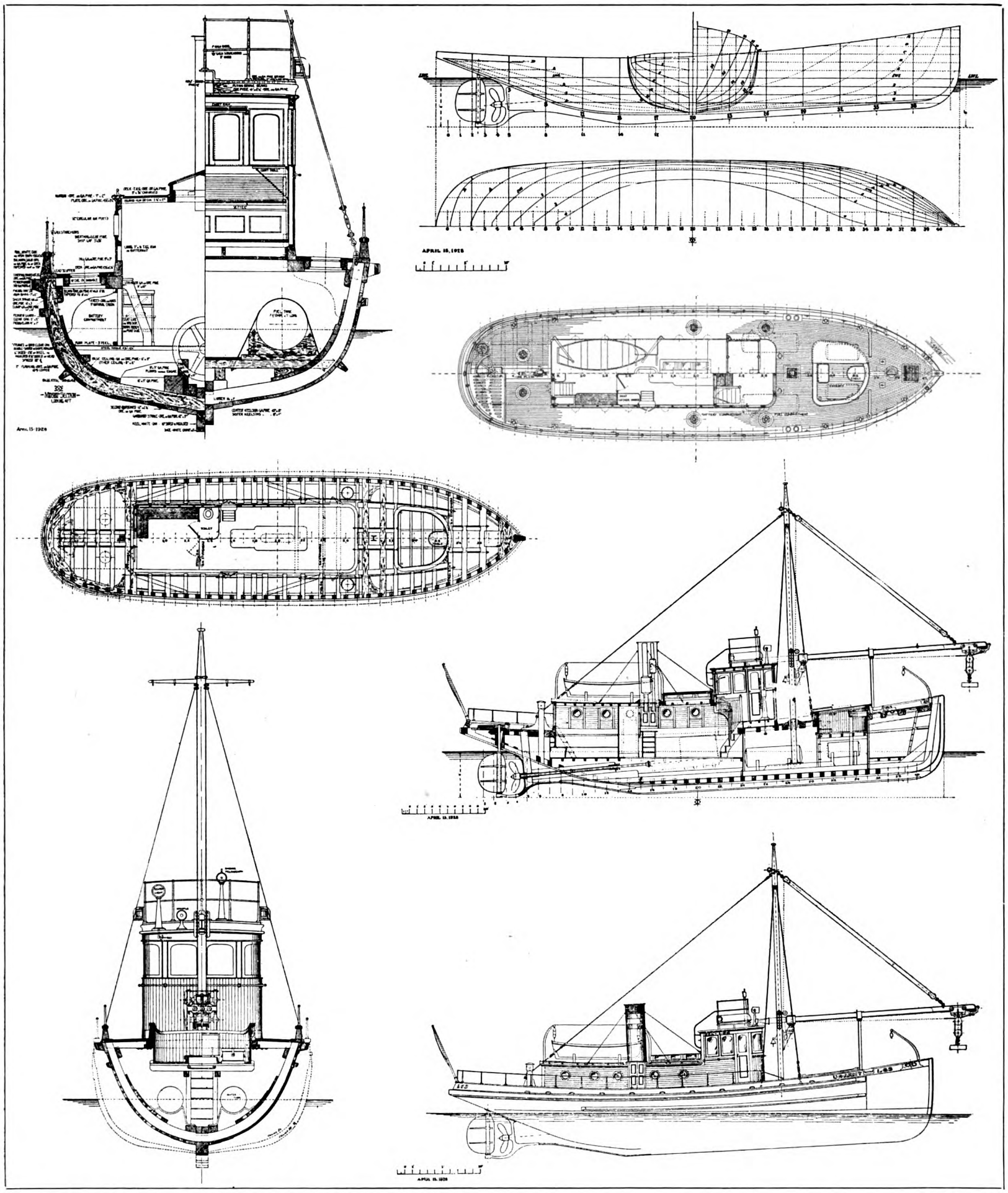
While specifications for these liners are not yet available, Mr. Dollar said that one of them would be assigned to trans-Pacific service and the other to the round-the-world cruises of the Dollar company. It is understood that they are to be sister ships. They will be of the latest type, probably of Diesel-electric, rather than direct Diesel-drive, and will include many unusual features for the comfort and entertainment of passengers.

Each liner is to be equipped with a cabin monoplane, to take passengers on sightseeing trips at each port of call; all the lifeboats will be motor driven; there will be a motion-picture theater and special accommodations, such as playrooms and nurseries, for children. "In size, these motorliners will exceed by 100 feet any of our present fleet of 50 ships," Mr. Dollar added, "and they will be the most modern and best equipped in the world."

For a new fireboat to be built for the Port of Galveston two 500 s.hp. Winton Diesel engines have been ordered. Cox and Stevens are the designers. Full details of this boat will appear in a subsequent issue of MOTORSHIP.

Generated on 2024-09-13 16:33 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Bids Called for Army Tug-Repair Boat

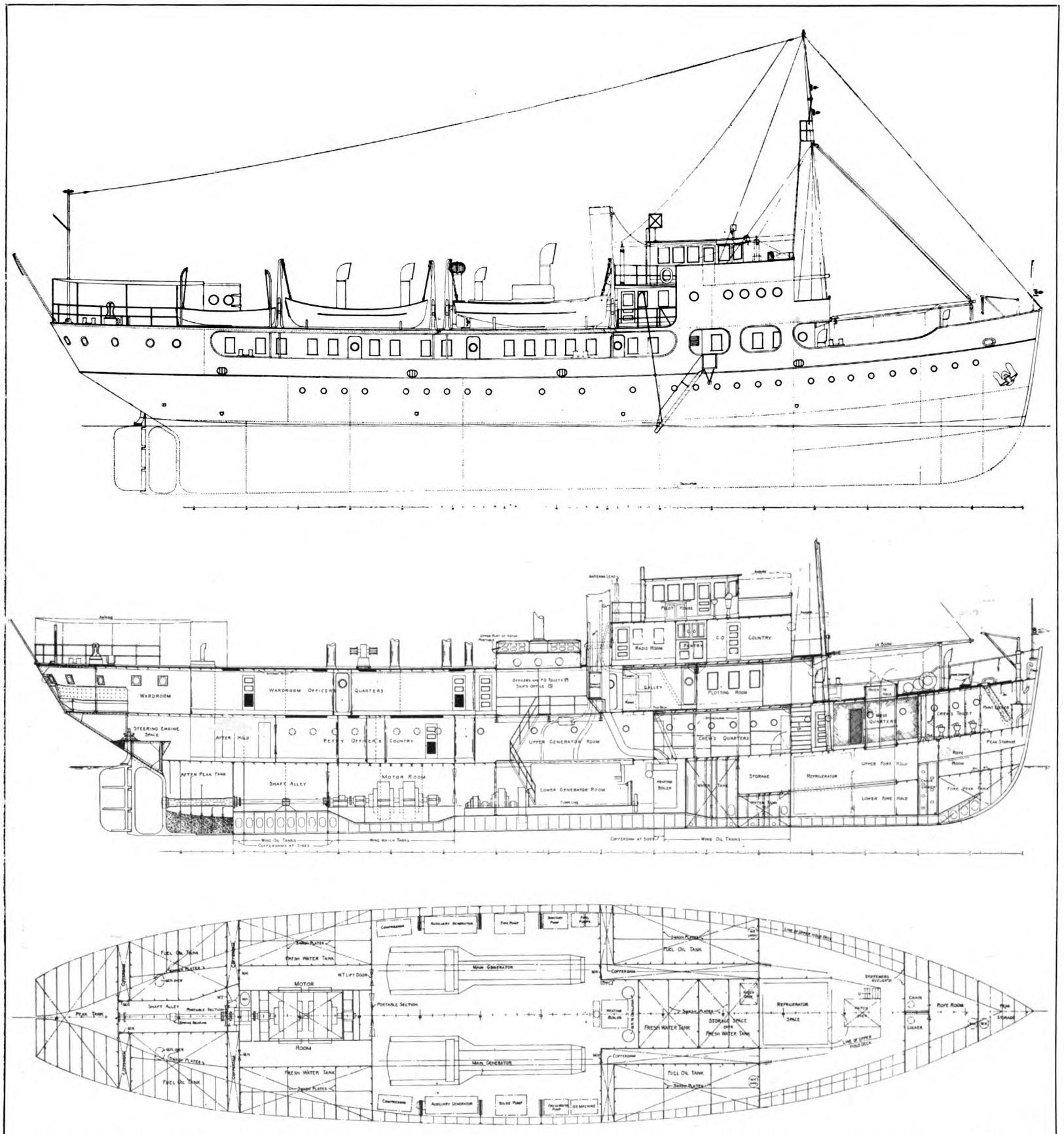


BIDS have been asked by the War Department for the construction of a small army tug for service in the Coast Artillery mine field work. The boat will be used for the making up of large distribution boxes in the various submarine cables, and will be used for occasional towing purposes for artillery targets or small boats.

Plans have been prepared by Major Frank Van Vleck, Supervising Marine Engineer, which call for a hull with an overall length of 64 ft. Her other dimensions are as follows: Beam (molded) 16 ft., depth (molded) 6 ft. 6 in., and draft of 6 ft. For propelling the boat there will be a four-or six-cylinder, 120 s.hp. Diesel engine of the two- or four-cycle type. A 300 ampere hour storage battery installation will also be provided to carry the light load when the generator is idle. Thus electricity is made constantly available.

Generated on 2024-09-13 16:28 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

U. S. Coast and Geodetic Survey to Build Diesel-Electric Ship



Inboard profile and plan of new Diesel-electric vessel to be built for the U. S. Coast and Geodetic Survey. Drawings, courtesy of Col. E. Lester Jones.

A NEW motorship, the HYDROGRAPHER, for which $400,000 has been appropriated, is to be constructed immediately for the use of the California division of the United States Coast and Geodetic Survey, according to announcement by Commander Paul Whitney, head of this division, at San Francisco, who has complete plans for the vessel. She is to be 167.5 ft. long, 31.5 ft. beam, and 18 ft. deep, with all modern equipment for coast and seabottom surveys and soundings. Diesel-electric propulsion, of make not yet made public, will be used, and all auxiliary machinery will be electric, with separate Diesel engines for the generation of current for their motors.

The general arrangement of machinery space and quarters is neat and well planned. The main engines and generators will be located amidships with the propelling motor room directly back of them. Since no cargo space is required the entire vessel may be devoted to machinery and quarters for the officers and crew, with ample provision for the work involved in making surveys. Large fuel and water tanks will give her an extra large cruising radius. The absence of stack and ventilators will not doubt add to convenience in setting out and picking up the small boats.

Generated on 2024-09-13 16:35 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Another American Double-Acting Diesel

Highly Satisfactory Results Obtained in Tests of the Sun Double-Acting Engine

By J. Barraja-Frauenfelder*

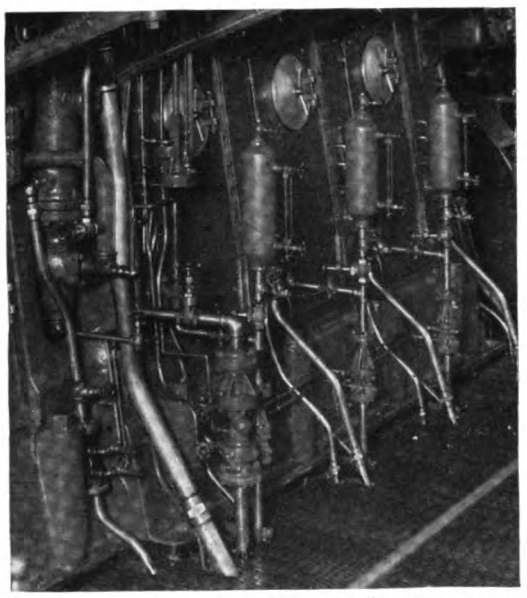
Part III (Continued from the June Issue)

A DECISION had to be made regarding air vs. airless injection. While modern tendency is toward the latter, the former was adopted for the following reasons: It was thought that full justice to airless injection could not be given in the small unsymmetrical space of the lower combustion chamber and that this method should be tried only when the size of the cylinder permitted two injection valves in the lower head. It was also thought that airless injection being a newer process would require additional experimentation on its own account for each size of cylinder experimented with, while the older method of air injection being more or less standardized and therefore surer would allow experimentation to be confined to the special features of the engine only. (In larger size cylinders it is contemplated to develop both the air and airless injection methods.)

As to auxiliaries, such as scavenging-pump air compressor, water and oil pumps, it was decided to use for the first a Root blower; for the second a commercial type booster compressor which would boost the plant's ordinary air supply at 100 lb. per sq. in. to the pressure necessary for injection; for the water circulation, city water was used and for lubrication an independently driven rotary pump was employed. By this arrangement the net results of the bare engine could be better analyzed and studied.

This unit was started in April, 1926. After various preliminary runs and adjustments, a ten days' continuous run was started October 18, 1926, with the following results:

Start 10:38 A. M., October 18th, 1926, end of run 12 midnight, October 28th, 1926.
Official starting time 11 A. M.



Pitot tubes for measurement of water quantities are arranged at the back of the engine

Readings taken half-hourly.
Total elapsed time 253 hours, 22 minutes.
Two stops were made as follows:
At 10:55 P. M., October 18th (20 minutes), due to broken auxiliary compressor first stage valve.
Second stop at 9:00 A. M., October 28th, due to steel chip in lower fuel check block (2 hours, 20 minutes).
Run was extended to exceed 240 running hours to make up for stops.
Total elapsed time.....253 hrs., 22 min.

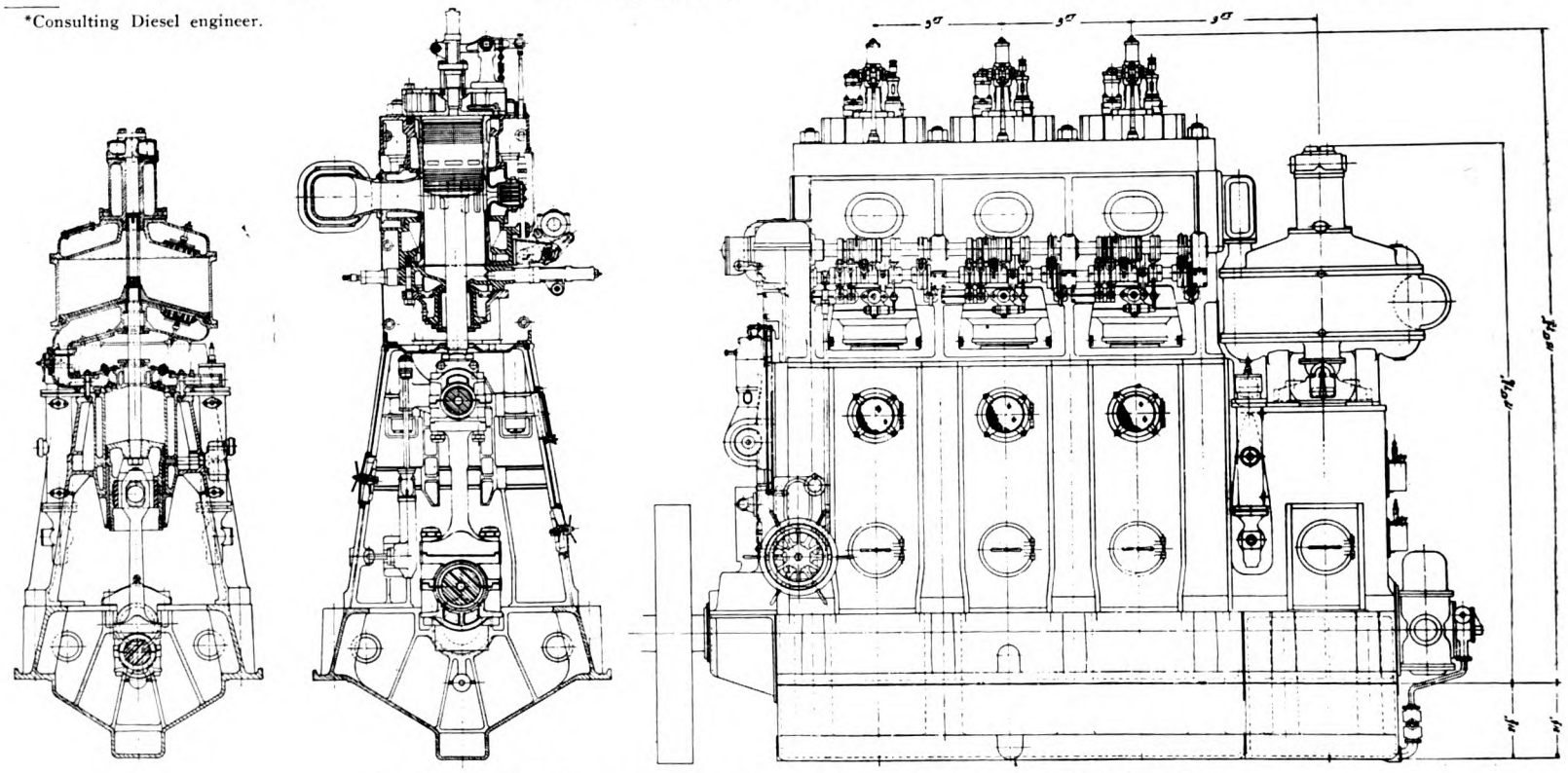
Averaged speed.....182.4 r.p.m.
Average b.hp. (brake).....190.3
Average i.hp.....242.8
Mechanical efficiency..... 78.3%
Fuel per i.hp.....0.369 lb.
Exhaust temperature.....358.9° F.
Pressure of scavenging air..2.03 lb. Ga.
Exhaust .....Invisible

No attempt was made to run the cylinder at full capacity although the i.hp. at the top end was equal to practically full load. Hence, the stresses in the structure under such conditions, were practically obtained. The reason for not running the engine at full load was that the water brake used turned out to be inefficient and incapable of carrying the full load without giving trouble. The results were, however, sufficiently encouraging to invite the completion of the three-cylinder unit in order to carry out a more complete test with a generator instead of a water brake.

This work was carried on as fast as possible and completed in the Spring of 1927. The scavenging pump and compressor group was not added until a year later.

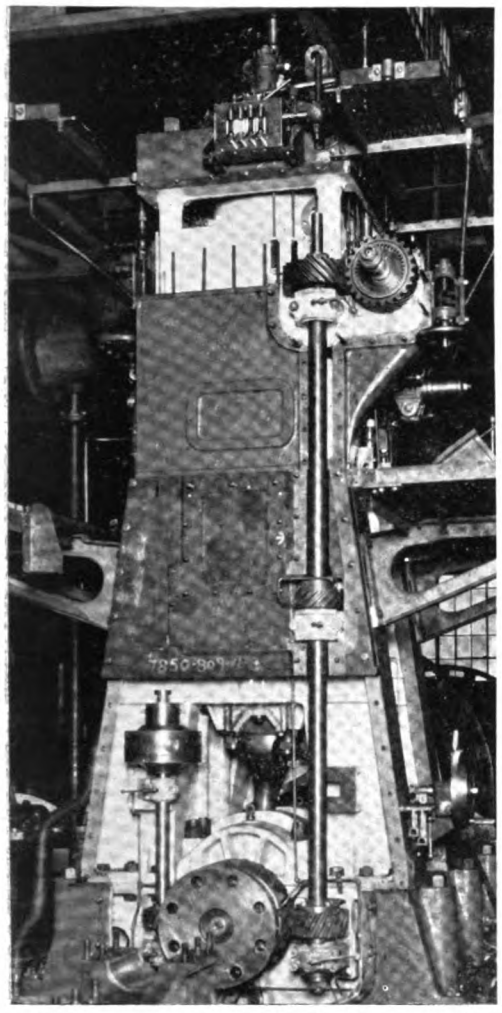
Various details are illustrated and give a clear idea of the simplicity of the unit. The bed plate is of substantial orthodox design, and the frame shows rugged construction. A simple crosshead guide arrangement and telescopic pipe unit for piston cooling is a special feature. Other special characteristics of design are the belt which contains the exhaust and scavenging ports, the latter backed by the feather valves previously described, and the lower cylinder head which is made of cast steel without ribs, thus facilitating the avoidance of uneven heat stresses. Shortness of the piston is clearly indicated while the end

*Consulting Diesel engineer.

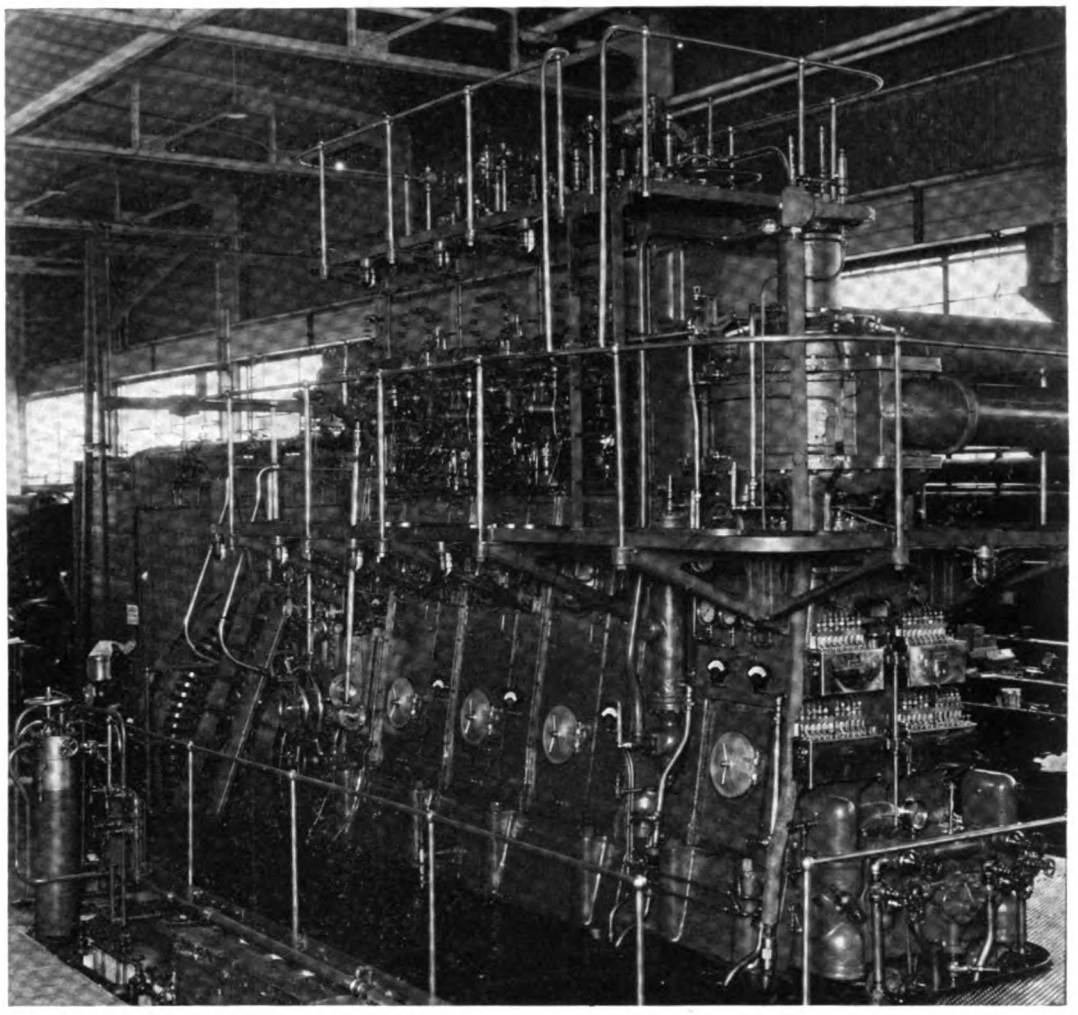


Cross section and general arrangement of Sun double-acting Diesel engine

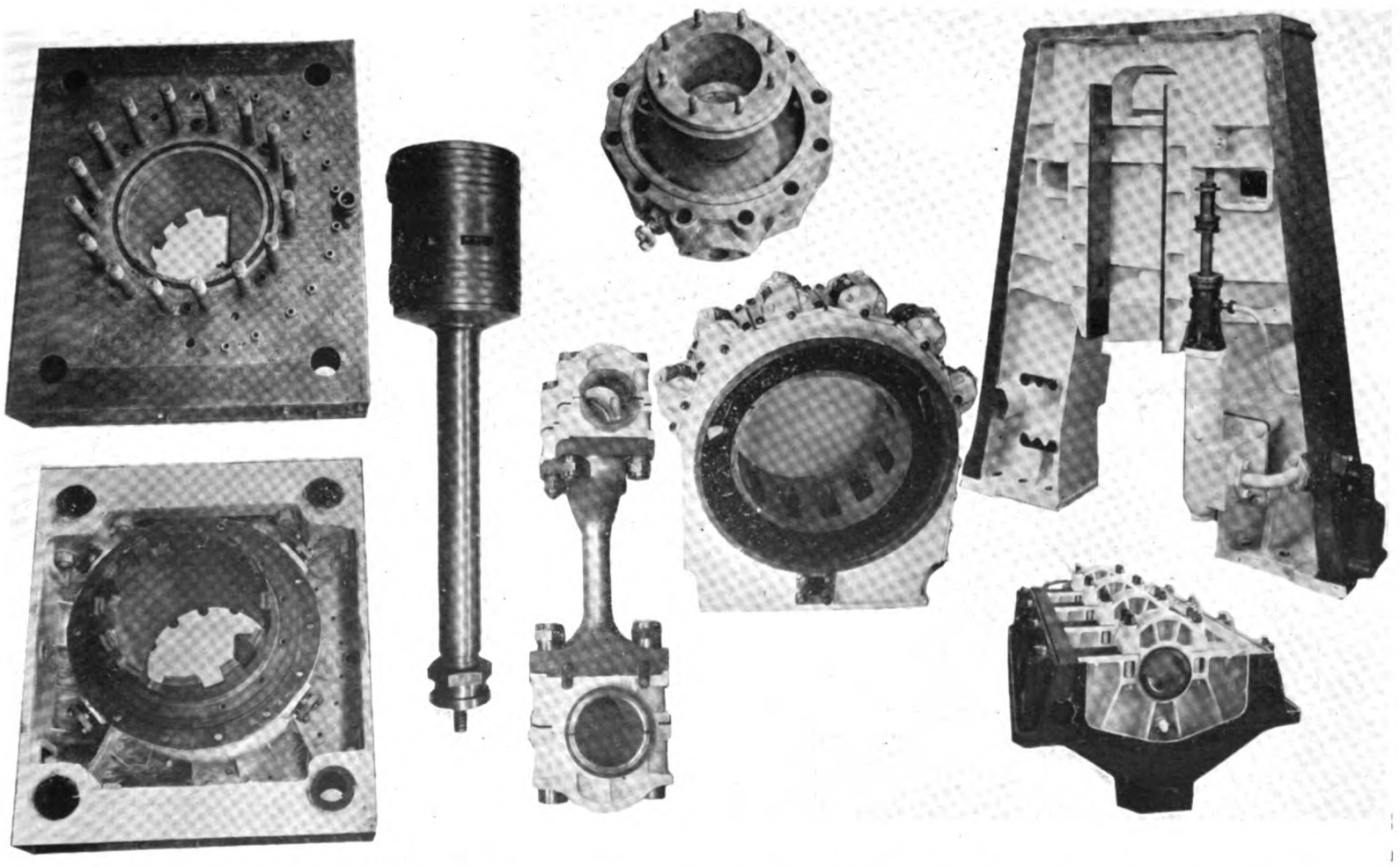
Generated on 2024-09-13 16:35 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



Engine under assembly showing camshaft and governor drive



Front of engine showing generator used in testing at the after end



Top: Left to right: Upper cylinder jacket with liner viewed from above; piston and rod (note shortness of piston); lower cylinder head showing water space and absence of ribs; "A" frame with water cooling telescopic pipes assembly. Bottom: Left to right: connecting rod; scavenging and exhaust belt with valves; bed plate

Generated on 2024-09-13 16:28 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

assembly during erection gives an idea of the method used for the cam shaft and governor drive. A good idea of the telescopic pipes arrangement for the piston cooling is seen by referring to the illustration showing the crank-pit covers removed.

The three-cylinder unit was thoroughly tested at full load with independent auxiliaries as with the one cylinder with the following results (summary of one of several runs):

I.hp. (rated)	966
B.hp.	861
Mechanical efficiency	89%

The mechanical efficiency at the beginning of the run was 85% after one and one-half hours it reached 89.5%; towards the end of the third hour it was well above 90% showing that the engine is capable of at least 90% on continuous runs at full load without auxiliaries. In other words, the friction of the bare engine is only about 10%.

Other data taken during the run are as follows:

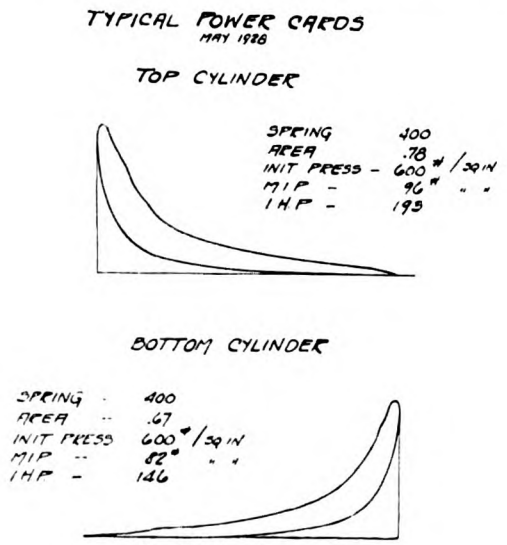
M.i.p.-mean of top and bottom cylinders	83.2#/sq. in.
Exhaust temperature	548° F.
Circ. water inlet	42° F.
Circ. water outlet from cylinders	130° F.
Circ. water outlet from pistons	100° F.
Injection air pressure	960# sq. in.
Scavenge air pressure	2.23# sq. in.
Lub. oil pressure	13.00# sq. in.
Fuel consumption	0.415#/b.hp.
Fuel consumption	0.369#/b.hp.
Overall thermal efficiency	33.7%

Typical cards taken during this run are reproduced. They show a slight overload of about 5%. The engine has been run up to 21.7% overload without trouble.

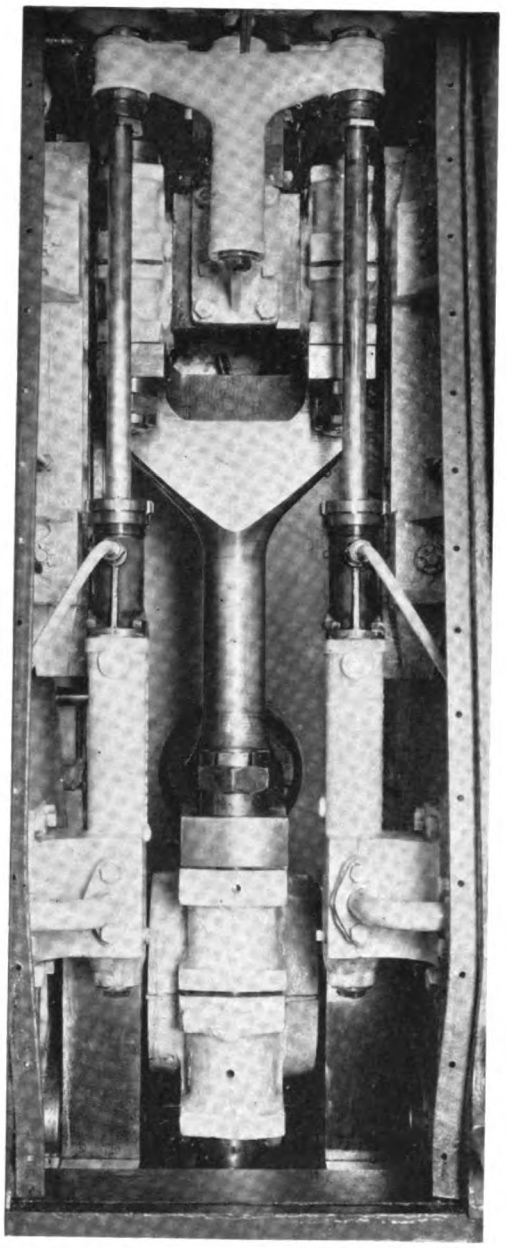
It will be noted that the upper cylinder gave a mean indicated pressure slightly higher than is the practice followed in ordinary two-cycle engine operation. This is due to the slight natural supercharge resulting from the scavenging valve arrangement which permits a slight increase in fuel burned without any noticeable increase in exhaust temperature due to the fact that the compression pressure is kept normal.

In all the tests of the one and three-cylinder units the most modern and reliable instruments were used. Recording instruments were used wherever practicable. These included Pyrometers, Tachometers and Continuous Card Indicators. All water services were fitted with venturi tubes so as to accurately check, for the determination of heat losses, all water quantities.

An alternating current generator was chosen for the absorbtion of power on account of its requirements for uniformity in



Typical power cards



Looking between A-frames showing piston cooling telescopic pipes

running conditions, it being assumed that if these are met, then D. C. and marine requirements would be easily fulfilled. The switchboard was arranged to throw the current into the plant's main line or into a water rheostat for maneuvering purposes as desired.

The results were considered satisfactory. It was decided to forthwith attach its own scavenging pump and compressor group to the engine on an extension of the bed plate. Results obtained in a final test of the complete engine will be dealt with in a subsequent article.

Large Diesel Cruiser for Pacific

Baron Long's 110-foot Diesel-driven cruiser is being equipped with a 300 s.hp. the yard of the Campbell Marine Construction Company, San Diego, and will be placed in commission, probably early in August, her first voyage being a trip down the coasts of Lower California, the Mexican mainland and Central America. The cruiser is being equipped with a 300 hp., Union Diesel engine, and is expected to develop a cruising speed of 12.5 knots.

All auxiliary equipment is electric, current being supplied by generators driven by two 24 b.hp. Diesel engines. Electric lights, hot and cold fresh-water, refrigeration, an elaborate sanitary system to permit the ship being anchored in restricted areas, carbon-dioxide gas system, fire-protection pumps, and electric deck-gear are provided for in the contract.

Accomodations for 12 guests, in addition to the owner's quarters are provided, and a crew of eight will be carried. This will be one of the largest, and probably the most modern, of the several Diesel-driven cruisers on the Pacific coast.

"A National Trade Journal"

ANY statement, any claim, any catch-phrase has value in proportion to the stability of the man or organization back of it. Any man capable of talking, can make a statement—can make any kind of claim. Until it is generally understood that the claim or statement has stability or character behind it, no particular significance can be given to it.

You will notice on the mast-head, stationery, etc., of this journal, the words "A National Trade Journal." That sub-head is on the mast-head of ten other leading Trade Journals. It means, in fact, far more than a mere intimation of the scope of each magazine. You can approach any journal bearing that sub-title with the knowledge that you will gladly be tendered the services of an organization comprising eleven of America's leading industrial journals for information or data or assistance that you desire, without compromise or obligation on your part.

Emmet Boyles

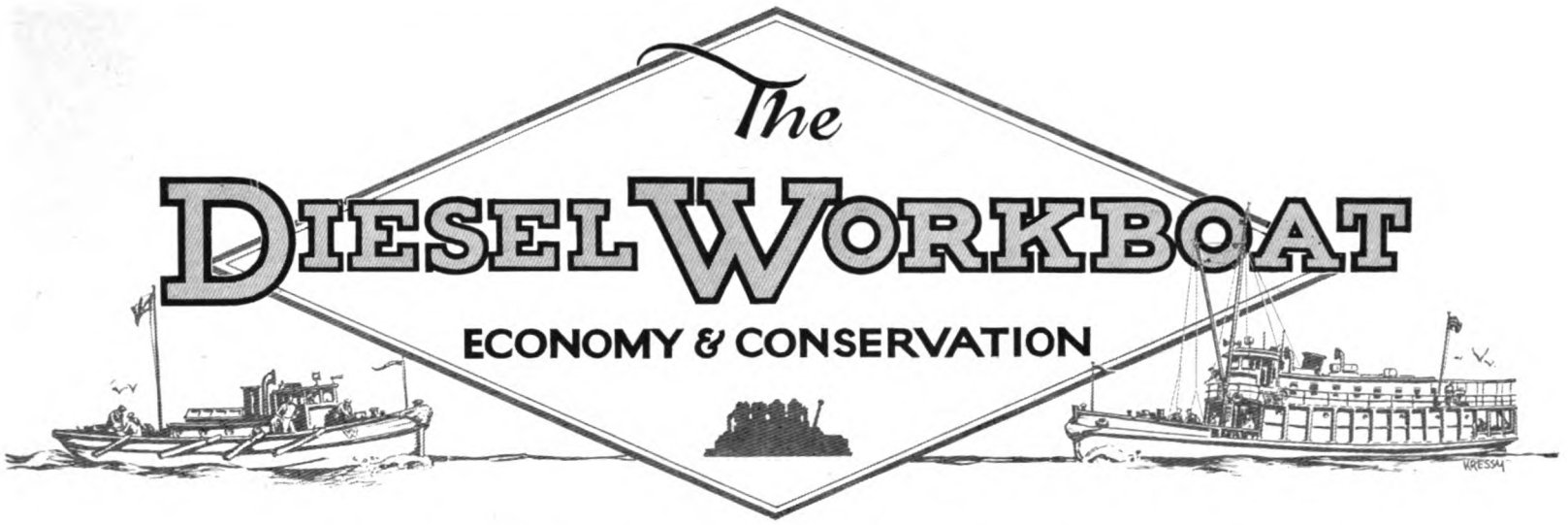
MOTORSHIP is under the ownership of "National Trade Journals, Inc.," the third largest publishing organization of its kind in this country. And, MOTORSHIP is still under the direction and management of its original Editor. Over $3,500,000 in cash (not one cent of stock) has been invested in the group of eleven journals. The matter of ethics, stability and equipment to do big things in a big way are absolutely essential to the organization. Can you visualize a merger of this sort without realizing that only men of experience and big capacity could bring it about?

National Trade Journals, Inc., is an organization of one hundred and fifty trained people. Every member has had to stand the test of successful experience and an in-born desire to serve. There is no limitation—no narrow concept of justice—no thought of trying to apply little means to accomplish big results. We want no man, —reader or advertiser—unless he is happily satisfied that he is receiving his full money's worth.

Emmet Boyles

(Emmet Boyles is Publisher of another of the National Trade Journals. He is an executive of much experience as editor, publisher and owner. He wanted to let his readers know what "A National Trade Journal" means. So he wrote the above. It tells the story so well that we pass it along.—*Editor.*)

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



New York Harbor and the Work Boat

Five Hundred Out of Seven Hundred Business Craft in World's Busiest Seaport Yet to Have Diesel Drive

DUE to its geographic location and peculiar geological formation, New York harbor has become the greatest existing seaport. Eleven through railroads—radiating like spokes of a giant wheel—distribute the commerce of all nations to the United States and Canada, and in return fill the holds of the world's shipping with the products of American industry. Unique among the cities of the world, greater New York is laid out on a series of large islands, and the city proper is separated from the terminus of its most important railroads by the Hudson river. This "isolation" forms the greatest barrier to freight movement between Manhattan and Long Island, and the transfer yards on the Jersey coast.

In spite of freight movement obstacles, there are housed in New York City and its environs, a population of nearly ten million souls, who are almost entirely dependent on the interchange of commerce by water, the Hudson and the East Rivers having become vast water highways, on which is shunted volumes of freight and passengers between Manhattan, Staten and Long Island and the Eastern Jersey coast that but a few decades ago would frighten students of international commerce. Dozens of special types of craft have been developed to fit this ever growing trade. Today there are over 700 self-propelled harbor craft earning, or endeavoring to earn their investment towing and hauling cargoes and passengers on these short runs. Vessels of every type—lighters, tugs, tenders, self-propelled coal and fishing boats, freight barges, small tankers, grain elevators, dredges, refrigerated vessels, fireboats, packets, car floats, ferries and sight-seeing craft, patrol boats go to make up this motley fleet. This figure does not include larger ships. While profits have been large, keen competition during the past few years, fuel costs, maneuvering difficulties and the high first cost of building ships have made the workboat operator's lot one of knotty problems as well as smiles.

As a result of these conditions we find that many operators of these workboats have turned to Diesel drive to solve their problems, 46 tugs of this fleet having been powered with oil engines. Together, with other craft of various types, over two hundred vessels in these waters now have oil engines. With its ease of handling and economy of operation in addition to the low cost for fuel, the Diesel tug has found a distinct place in this busy scheme of trans-

COPYRIGHT FAIRCHILD AERIAL SURVEYS, NEW YORK CITY

There are over 700 tugs, ferries and dredges in New York Harbor. Large numbers of coastwise steamers are also operated from this point. They need to be converted to, or replaced with, modern economical Diesel power. Much educational work remains to be done among owners

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

portation. Ever since the late world war coal prices have been steadily rising, and simultaneously the costs of fuel oil have been steadily dropping. In 1918 Diesel oil cost over $6 per 42 gal. barrel. Today it is less than $2—lower than two years ago.

It is true that a large percentage of the operators of workboats in New York harbor area are large railroad companies who control vast coal mining properties. Yet paradoxically, they have been among the first to realize the possibilities and economies of Diesel operation. Two of the largest railroad companies in the world, the Pennsylvania and the New York Central, operate a number of Diesel and Diesel-electric tugs for pushing their immense fleets of carfloats and lighters to terminal connections, and are constantly adding to their fleets. Two new oil-engine installations are now in progress by the Pennsylvania and the company plans the eventual Dieselization of their entire fleet. The New York Central is likewise solving its harbor problem with Diesel-electric drive. There are nearly 40 tugs in the Pennsylvania fleet, aside from innumerable ferries, barges, etc.

One by one the various companies have turned to this efficient power for their boats until now there are few left who do not operate one or more boats. It is but a matter of time and continuous effort by those interested in the industry, until all of the fleet will be oil-engined. But a constant drive and continued educational work by the Diesel industry and by this journal is essential to expedite action. Here in this busy shuttle of work the Diesel engine is getting one of its most severe tryouts. Long hours to meet exacting movements of freight, while actual traffic conditions on busy mornings in lower New York Harbor are of such nature that maneuvering is about all the headway possible. Starting, stopping and reversing, and quick changes of speed have proven the husky workboat Diesel.

An important question confronting the steam workboat operator is the ultimatum recently handed down by the Department of Health of New York City. That is the elimination of the ever thickening pall of harbor smoke that is caused by the soft-coal burning workboat and by larger steamers. Either their operators must turn to the high priced anthracite coal, or burn oil under boilers. The latter is a waste of valuable fuel. The most likely solution is naturally the smokeless Diesel, which will trim the fuel bill into quarters as well as cut down smoke. To any other seaport but New York, such a problem as smoke might not be considered an important factor in conversion to Diesel drive. But, centered here is a vast industrial area, and together with the crowding caused by a building type that is spread both upward as well as outward, the smoke annoyance is a highly important factor to consider when building a boat for service in the waters around it. It is obvious that no workboat operator can afford anthracite coal or wasteful fuel-oil installations if fair comparisons are made with Diesel engine power.

A statistician has figued that an ocean liner clears New York Harbor every hour, and that several trainloads of coal and nearly as many of food are lightered around the harbor every day for New York consumption. All of these movements require the use of tugs or lighters. The great produce markets of lower Manhattan begin to stock up late in the afternoon for the coming day, and the rush of cars from the produce terminal in Jersey City is executed silently and swiftly by a fleet of tugs. A liner is loading general cargo and manufactured goods at her pier in Brooklyn from the decks of scows and lighters maneuvered around by the ever-present workboat. Along the East River tall gray stacks of some of the largest power-houses in the world tower over clamshell buckets that bail coal out of a barge tended by a tug; and at midnight the last whistle sounds from an ocean liner at her North River Pier as a fleet of tugs nose her down the river enroute to other continents.

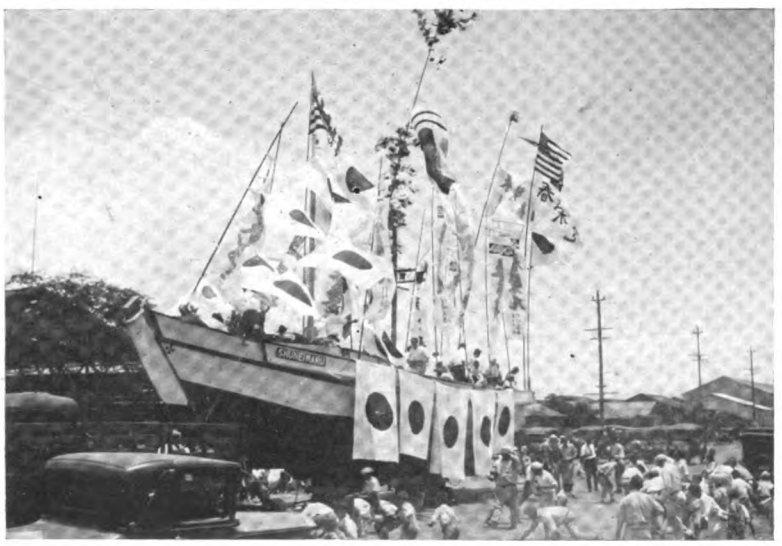
It is a busy picture that these seven hundred workboats are painting, and they will turn eventually to the Diesel engine with its low rate of fuel consumption, its quick response in maneuvering and absence of stand by losses to keep costs down and more efficiently bridge the last link between the producer and New York City.

Three Diesel Powered Sampans for Hawaii

CLEAVING the sea at a good twelve knots, K. Hamada's KASUGA MARU 828, largest and finest sampan ever launched in Honolulu, recently left on its first fishing trip to the grounds where great schools of aku congregate, off the Waianae and Aiea coasts of Oahu Island. Seventy-three feet over all, with a 12′ 6″ beam and 4′ draft, the big sampan is powered with a 110 hp. four-cylinder, four-cycle Atlas-Imperial Diesel engine that thrusts it along like a glint on the sunlit island water.

The men go with him—for in Japanese sea parlance MARU is masculine—and the quest is for aku, a Hawaiian tuna fish that moves in schools close off-shore. Once near such a school, detected by the hovering birds above, they shut down their engine, glide over the bank of aku and throw overside many minnows of nehu—small fish two and three inches long. The aku, rushing this bait, are easily taken with brightly tinned, unbaited hooks that closely resemble the frightened nehu. So rapidly do the aku strike, in fact, that the motion of the Japanese fishermen with their short rods and line is practically continuous, the fish being captured as fast as the lines can be lowered. As many as two tons are taken from a school.

A tribute to the craftsmanship of S. Funai, Honolulu specialist in sampan designing and building, the KASUGA MARU 828 is one of the fastest sampans in the world. She is also one of the most seaworthy, and as a result of the Diesel installation one of the most economical to operate.



The SHUNEI MARU, *on the launching skids at Honolulu. She is one of the finest sampans in the Pacific and is Diesel powered*

An hour's ride of thirteen miles costs these ten fishermen of the KASUGA MARU 828 but thirty cents in actual fuel and oil consumption, the hold loaded with fifteen to twenty tons of aku. The same thirteen miles under gasoline power would cost nearly ten times as much, without other good features that characterizes the Diesel installation in this typically Oriental craft.

The KASUGA MARU 828 is electrically lighted with Edison storage batteries, yet consumes with this additional power load (charging) but approximately five gallons of 24 deg. specific gravity Diesel oil an hour, when running at the full speed of 12 knots. Robert Ely of the Honolulu Iron Works Company, agents for Atlas-Imperial engines, made the installation. The boat is operated by the Honolulu Fishing Company.

Another sampan recently supplied with an Atlas Imperial Diesel engine is the KASUGA MARU 544, property of K. Izumi, formerly of Hilo but now a member of the Hawaii Suisan Kaisha of Honolulu. Running on gasolne, this boat had cost $110 a week to operate. Outfitted with a 70 hp. Atlas-Imperial Diesel engine, the cost has been cut to $12 a week.

This boat, also used for aku fishing, carries a crew of eight men and is 65 ft. in length. She will do 11 knots with the Diesel installation, and like the KASUGA MARU 828, makes no provision for ice, the fish being brought in the same day that they are caught.

Of a different type is the SHUNEI MARU. This boat, recently built, also has a Diesel installation. She is a deep-sea fisherman's boat, provided with ice wells, and may remain at sea from 10 to 20 days.

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Caterpillar Drive on Diesel River Tug

Advanced Design of Towboat and Barges, and Employment of Railway Methods of Transportation, Mark Inauguration of Service on the Cumberland River

YEAR by year the flood of population has been moving over the Appalachian mountains into the great valleys of the midcontinent, adding to their agricultural and industrial development, and exploiting their mineral riches. So marked has been this trend that center of population has shifted in fifty years from a point in eastern New York State to a point approximately on line between Illinois and Indiana. Every mile that the population moves west and south, every new million of people that comes into the central states further adds to the wealth and the development and the power of these valleys.

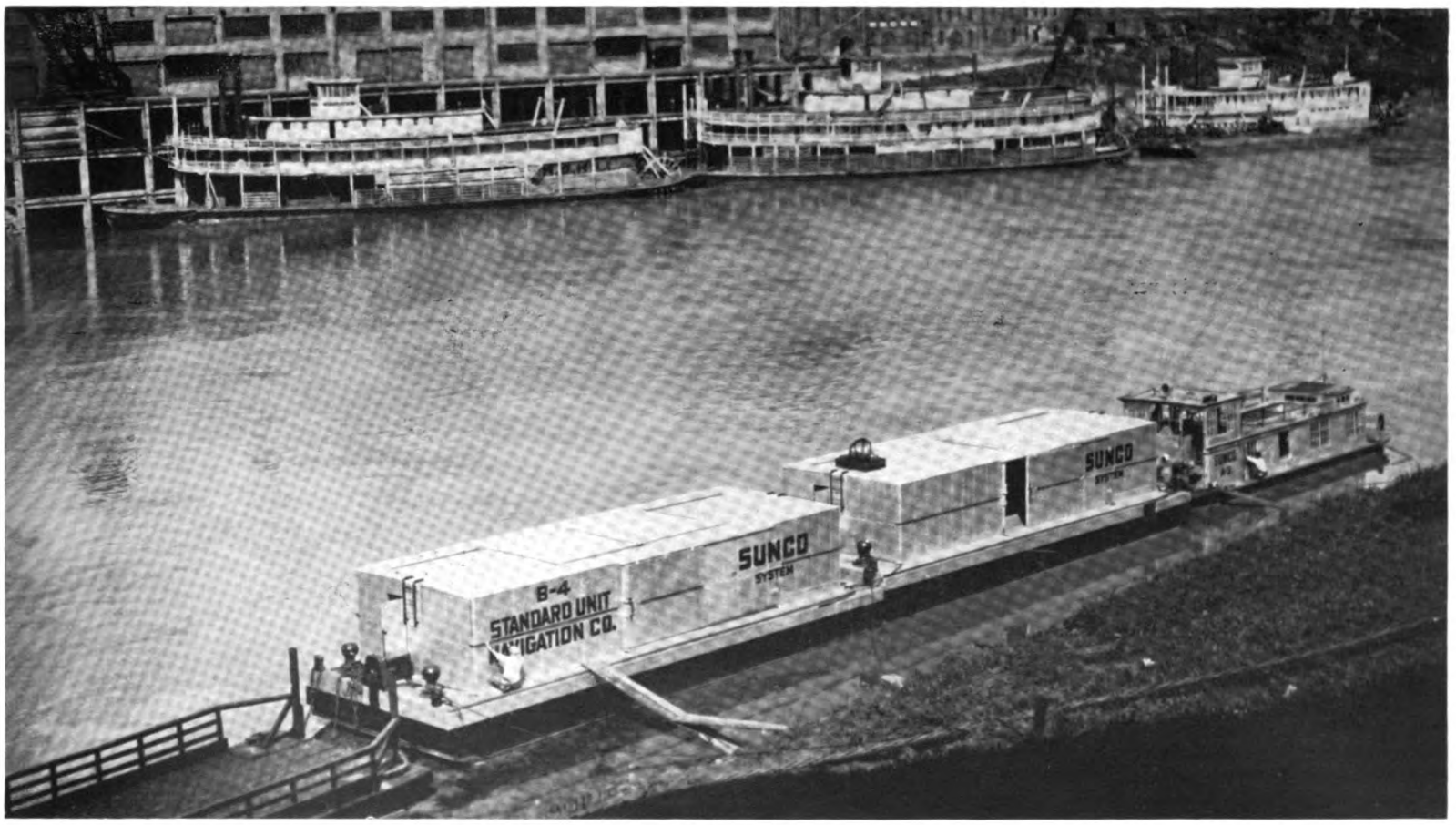
There is an unlimited amount of freight of all kinds, incident to the daily lives of these millions of people. This is interchanged among the towns and cities directly on the rivers or within trucking distance of their banks. Movement of goods for the daily needs of the sixty million inhabitants of the Mississippi Valley has been a burden for transportation. Railroads, steam and electric, have put forth every energy to meet this condition with extension, improvement and new construction. Recognition of the potential importance of the rivers has never been lacking. Hundreds of millions of dollars, the best engineering brains, the best years of many active, forceful lives have been spent in the effort to make the potentialities actual.

Basing their thought along these lines, the Standard Unit Navigation Co. of St. Louis, have developed an advanced type of Diesel towboat of unusual design with a peculiar form of drive. The caterpillar tractor principle with paddle blades on a chain is used. Construction was carried out by the Nashville Bridge Co. of Nashville, Tennessee. Preliminary tests run on the Cumberland River have been highly satisfactory to the owners.

Prior to making a complete description of this tug we will call attention to the fact that it is a laboratory boat built mainly for the purpose of demonstrating and proving, in actual service, the adaptability of the caterpillar principle to paddle propulsion. A larger boat in which Diesel-electric power will be employed in conjunction with reduction gears and chain drive is now being built and a contract has been let by the same owner for a third and similar boat. Barges of new and unusual design have also been completed. After the completion of the third hull which should take place in about thirty days—delivery of one barge per week is guaranteed by the shipyard. Not less than twenty-two of such barges have been contracted for, and an indefinite continuation of the building programme is confidently expected. At the present time two barges and one tug are in service on the Cumberland river. We had the pleasure of inspecting this craft at Nashville during June, through the courtesy of J. C. Jefferies, chief engineer, of the Standard Unit Navigation Co. Thus we are enabled to pass along details to our readers first hand.

The SUNCO A3—as this novel towboat has been named—is a catamaran 50 ft. long, 14 ft. wide overall, 4 ft. moulded depth and with 28 in. mean draught. She is powered with one 50 hp. four-cylinder, four-cycle Cummins Diesel engine, 5½ in. bore x 7½ in. stroke with a rated speed of 600 r.p.m. Her fuel consumption at full load is about three gals. per hour, which means a fuel bill of approximately 18 cents an hour—just a fraction of the cost of steam power. The boat complete and fully equipped weighs between 18 and 20 tons.

These dimensions and weights seem small, but we have been assured that nothing has been done without a very definite reason. For one thing the boat, and the barges which she will push, are intended for operation in waters of as little as three feet of depth. And the height above water is such as to permit transit under the lowest bridges during high water.



A sharp contrast between the old and the new. Two steamboats in the background went under the hammer just prior to inauguration of service with standardized equipment and Diesel power

Generated on 2024-09-13 16:35 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

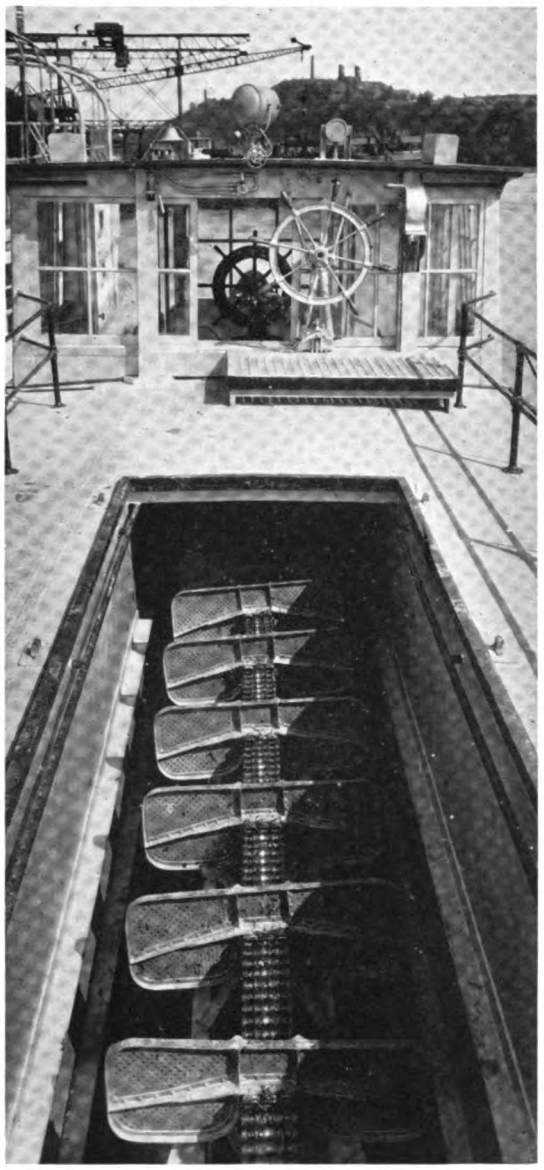
The hulls of the catamaran are made of light sheet metal with longitudinal framing. They are substantially tied together with transverse beams and steel decks fore and aft. The pilot house and control gear is located forward while the engine, transmission and reversing gear are on the stern deck in a small cabin. Therefore the machinery installation is not based upon precedent and does not conform to recognized standards in this form of work. But this should not detract from its apparent practicability, as the whole job is specialized.

The engine is set thwartships on the hulls, and is securely bolted to two beams, the latter also supporting an entirely new type of transmission and reversing gear constructed by the Niles Tool Co. The gears are of heat-treated alloy steel, hardened and ground, and were cut with the Maag system. They remain in constant mesh. Forward and reverse motion of the propelling drive is accomplished by means of two interlocking clutches, which cannot be engaged in both directions at one time. The gear wheels are close fitting and run in an oil tight casing. Bearings throughout the transmission system are S.K.F. ball-bearings. In fact no other make of bearing is used throughout the entire driving mechanism, save in the main engine, and it is said that a mechanical efficiency of 98 per cent is obtained between the engine shaft and the paddles.

The reverse gear ratio is:—

Forward speed—85½ per cent of engine r.p.m.
Reverse speed—85½ per cent of engine r.p.m.
Drive chain:—
Pinion 17, *sprocket* 88—1: 5.18 ratio.
Paddle sprocket speed to engine speed —16½ per cent of engine r.p.m.
Paddle sprocket—9ft. in circumference.
Paddle travel each revolution of engine—1.485 ft. giving 0.0169 x engine r.p.m. = miles per hour of paddle travel.

Since the engine and reverse gear are mounted on the same steel foundation, the possibility of misalignment or of shifting their relative positions is remote.



Top view of caterpillar drive with paddles and Link-Belt chain

The combined reverse and transmission gear is on the starboard side of the tug and extends below deck into the starboard pontoon. A small sprocket wheel is attached to the driving shaft of this gear. Inasmuch as it is difficult to draw a word picture of this gear, and since details of its construction can be gotten from the owners of the tug, it will suffice to say that the highest grade of automotive transmission practice has been employed. The gears in operation, under full load, are as silent as the gears in a high grade automobile.

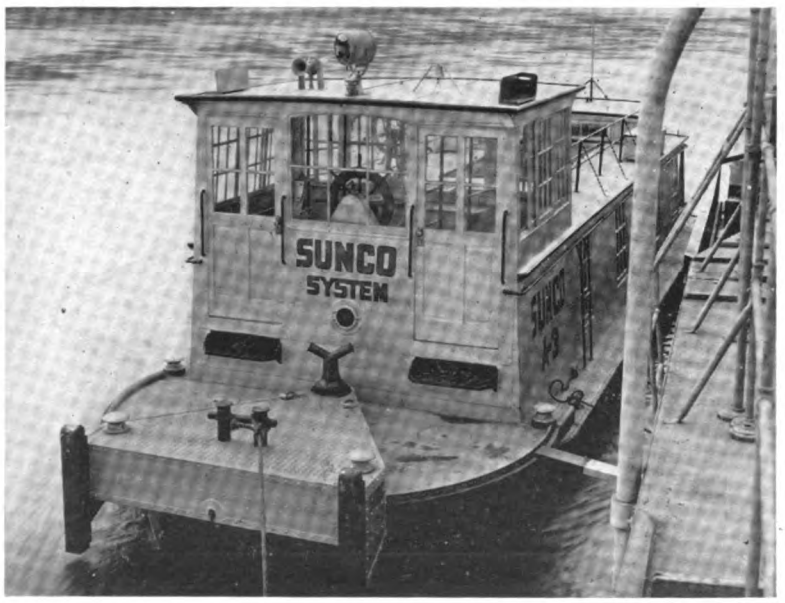
In our devious ways we are approaching the caterpillar drive. It consists of a chain with blades attached in a manner resembling the method of attaching buckets on a chain conveyor. This work was done to special order by the Link-Belt Co., whose engineers made a deep study of the project. This firm also made the outer sprocket wheels of the caterpillar drive.

Between the hulls of the catamaran is space for the paddles to work. Substantial S.K.F. ball bearings are mounted fore and aft in this space. Two shafts are mounted in bearings one forward and one aft. Each of the shafts carries a sprocket wheel. The after sprocket wheel is driven as will be described later. Reference to the illustrations may help to visualize the form of paddles and chain arrangement.

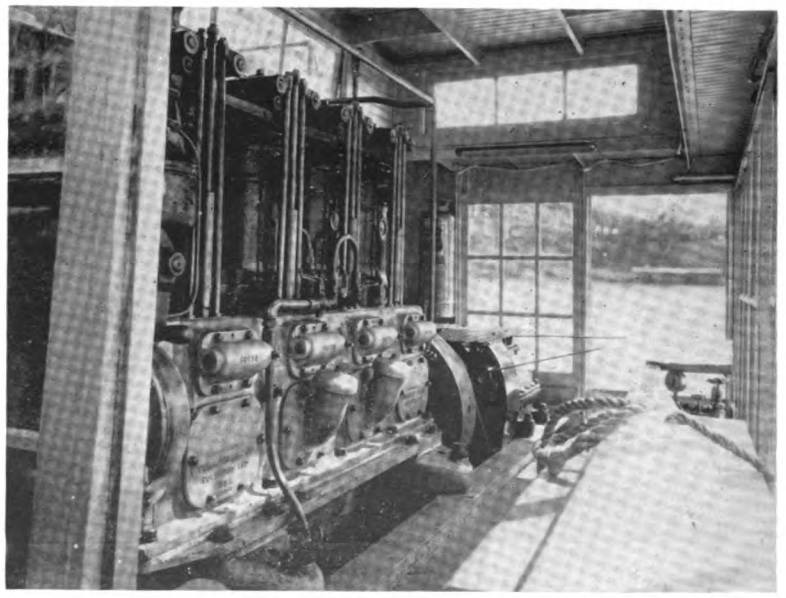
The weight of the chain and paddles is carried on an endless cable, which is also rove around the sprocket wheels. It has a spring loaded tightener, which maintains the tension on the cable and takes up stretch or wear. The pull exerted to drive the boat is taken entirely by the chain. Bronze center-rollers in this chain are spool shaped where they ride the cable. This roller arrangement is used because there is a speed differential between the chain and cable and a certain amount of creeping occurs. But, there is no rubbing action to shorten the life of the cable. It should also be noted that the assembly is such that the chain or cable may be easily removed and renewed when the condition of wear prompts it. One of the main sprockets is capable of being shifted to take up slack occasioned by wear of the chain.

The after sprocket shaft extends into the starboard hull of the tug. Mounted on one end of this shaft is a flexible coupling of special design and construction. This permits a slight misalignment without causing trouble. The caterpillar drive shaft is driven with a sprocket and chain from the reversing gear. Mounted on the drive shaft is a brake, which may be used to stop the paddles before letting in the reverse clutch.

It is at once apparent and fully recognized by the designers, that the pull exerted



Bow of tug with steering-knee controlled from pilot house and operated with compressed air



View across engine-room showing new type Cummins oil-engine with aluminum alloy bed-plate

Generated on 2024-09-13 16:29 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

on the sprocket chain between the reverse gear and the caterpillar drive, would be too great to be carried by the necessarily light hull. For this reason the reversing gear and propelling mechanisms have been substantially tied together with a steel structure in constant compression as the tug is being propelled, so no stresses are absorbed by the hull proper.

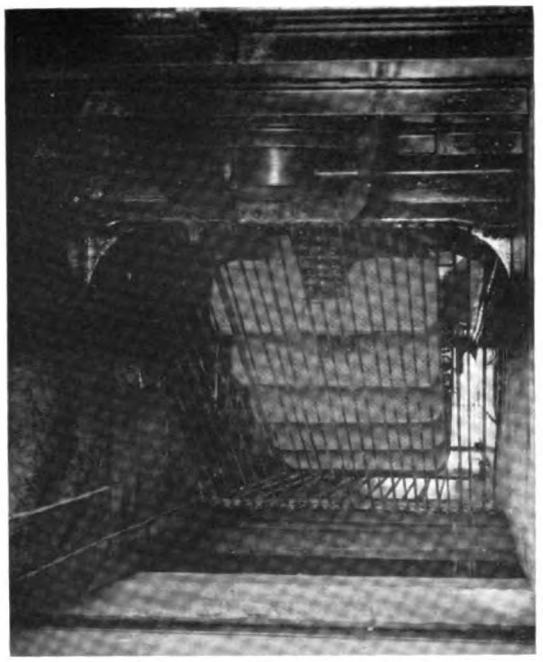
When the paddle chain is put in motion, the steel paddles travel submerged from a point near the forward ends of the boats to a point near the stern and exert a pull parallel to the keels. One paddle following closely behind another, on a direct line, naturally brings to mind cavitation. This is reduced by perforating the paddle blades. Experimentation is still under way in order to make the resistance of the blades just sufficient to maintain the engine speed at the correct r.p.m. This involves increasing the diameter of the perforations until the engine is unloaded sufficiently to permit the r.p.m. to be raised to normal.

In making a trip on the Cumberland river aboard the SUNCO A3, we observed an absolute absence of vibration. We are not violating a confidence placed in us by stating that the hulls are light. It appears that it would be impossible to install a similar amount of power in heavy engines with some other form of drive and get away with it. A remarkable feature of this boat is the fact that with such light construction it is possible to mount an engine on deck and drive paddles without creating undue stresses. We also observed that the paddles in taking and leaving the water created but little disturbance. In fact the chain which drives the paddles lifts more water than do the paddle blades. With an open hatch above no water was thrown on deck.

In order to protect the chain driven paddles from logs and drift wood a screen of steel bars has been fitted between the hulls. But in the event of this arrangement not providing full protection, there is sufficient give to the blades to prevent breakage except under very unusual conditions. And should a blade be damaged beyond repair it may easily be removed, and replaced as provided for in the design.

The SUNCO A3 is a pilot-house control job. Manual control is also provided for in the engine room. In normal operation all maneuvering will be done with compressed air. Air rams of conventional type are used for shifting the clutches. Dual control is employed, one set of controls being mounted in the pilot house and another on the upper deck back of the pilot house. This latter is a vantage point which may be used while working behind barges and permits a clear and unobstructed vision, not always possible while in the pilot house.

The air controls are unique. The main control for maneuvering resembles a bridge telegraph. It has a key handle, which when removed, prevents anyone from tampering with or inadvertently shifting the controls. This device is simple in construction. It consists of a solid block of castiron in which a network of passages have been drilled, and in which is also arranged a series of poppet valves distributed radially around a central shaft. This shaft carries a set of cams which engage different valves at different positions of the control lever, causing compressed air to flow to the proper air-ram. The device was designed by the Standard Unit Navigation Co. and built to special order by the Logansport Machine Co., who also supplied the air-rams.



Looking aft between pontoons. Protection of paddles is provided with steel bars

Additional control gear was supplied by the same firm to operate the steering knee on the bow of the tug. This steering knee consists of a triangular shaped table pivoted on a heavy king-pin at one corner. Beneath it is a reduction gear and wildcat which is part of a standard chain hoist. It is operated with a Chicago pneumatic air machine. By admitting air to the machine, a chain which is fast at either corner of the bow of the tug, is hauled through a set of sheaves. This shifts the steering knee on a ball-bearing track. The illustration of the bow of the tug clearly depicts this design.

By making the steering knee well fast to the stern of a barge, as when "pushing a tow," and then by operating the shifting gear the tug can be swung to an angular position in relation to the tow and held there. We watched this device in operation. The tug was swung with it against a three-mile current to almost right angles with the bank of the river and held in that position.

The steering knee is held in central position with a locking-pin operated with a spring and air-ram with remote control from the pilot house or bridge. It can be made to hunt and pick up, the mid position thus again placing the tow on a straight line with the centerline of the tug. This is accomplished by releasing the air control and manipulating the helm.

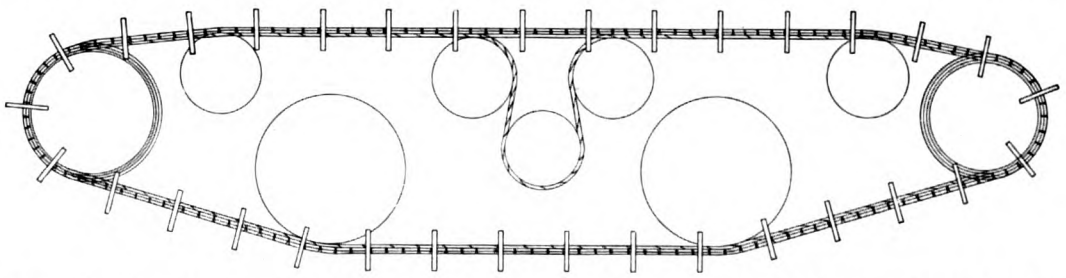
The steering knee provides a secondary means of steering. Two rudders are used at the stern of the tug. They have a peculiar geometric arrangement of levers by means of which one rudder takes on a greater angle than the other in hard over positions. Both rudders are controlled with a single helm. The differences in angles are caused by a peculiar link and lever tiller arrangement. It is claimed of this arrangement that whereas little helm effort is required to move the rudders, a much greater reverse effort applied at the rudder will not cause the helm to move. Therefore, the rudders will stay where put until moved by the pilot with the steering wheel. The steering gear connecting the pilot wheels to the rudders is a simple standard gear produced in Chicago, and in design does not differ from other equipment of its kind.

In the lighting system of the tug a departure is again made from standard marine practice. Yet we find nothing but sound logic and a perfectly workable scheme employed. A Delco-Remy generator is driven by a pulley and belt from the main engine. The generator charges a 300-watt Willard storage battery, which supplies current to a 12-volt bus lighting system. A Delco-Remy relay control is also used and the switch and fuse board is standard bus equipment. The wiring system and light sockets are also products of the automotive industry. With a 25 amp. charging rate it is expected that the auxiliary unit will not be needed except when the boat is idle over a long period of time. It is not the intention of the owners that such should ever be the case. Provision for emergency lighting is provided, however. The same generator is driven with another belt by a small gasoline engine, which also operates a single stage air compressor. Compressed air is supplied for maneuvering purposes by another two-stage compressor driven by the main engine with a belt.

Housed in the port hull is a small galley and mess-room with oil-stove, ice-box, sink, dish-racks, dining-table and seats. The latter two items fold against the wall. Running water for drinking purposes passes through the ice-box and is supplied by a 45-gal. tank in the pilot house. Extra storage of ice is provided for with a large ice-box under the pilot house floor. Water for washing dishes and toilet purposes is taken from the river with a hand pump, while hot running water is piped to the galley from the engine cooling-jackets.

On the starboard side are the sleeping quarters with four folding berths, benches to sit on, and lockers for clothes. Aft of this space is a toilet and washroom. Two extra folding berths are located in the pilot house.

The boat is steel structure throughout with the exception of the wooden cabin decks, window



The caterpillar-drive with Link-Belt chain and sprockets showing paddle arrangement, cable and tightener

Generated on 2024-09-13 16:31 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

frames and doors. The decks are canvased and painted. From end to end, inside and outside, except the canvas-covered decks, the boat is painted with aluminum paint, the reasons for which are mentioned later in this article in the description of the barges.

The deck is well equipped with searchlight and standard running lights. Towing gear of special construction is patterned after couplers on railroad cars. Every effort has been made to save space and weight, even to the utilization of the hand rail as a speaking tube. It is said by the designers that the problem of weight was a serious one. This perhaps accounts for the small fuel and fresh water tanks, the former only having a capacity of 330 gallons and the latter of 45 gallons. The estimated towing radius with two 75-ton barges is 525 miles on a fuel consumption of 75 gallons per day or 1050 miles while running light. This is indefinite, since the radius of action as measured in statute miles would depend upon whether the boat were working up or down stream.

The development of this tug and system of barges is said to be the first of its kind in the history of inland water navigation. An attempt has been made to utilize all of the inherent advantages of a natural trackage system provided by the rivers and to utilize these with the most efficient and highly perfected equipment of a modern railway system. Modifications have been made in order to, in a practical way, cope with the inevitable problems of water transportation.

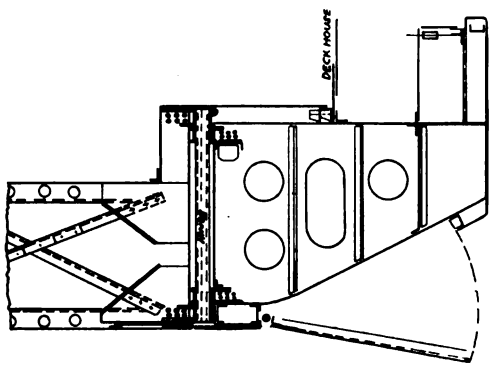
It is apparent that the development of a new type of drive must be justified at least in the mind of the inventor. It would require too much space to explain all of the reasons. One, however, which may be apparent to the layman is the difficulties said to be encountered with paddle-wheel boats operating in very shoal water. Heavy vibration produced may be accounted for by the peculiar currents set up between the wheel and the river bottom. It is said that the very best of practice of the old wheel requires one-half of the equal draft of wheel-bucket in depth of water under it for fair efficiency. Whereas, the blades of a caterpillar drive travel approximately parallel to the bottom of the river, and make operation possible with only about a foot of water between the paddle and the river bottom. A slightly higher efficiency is attained in greater depth of water.

This tug and the barges built at Nashville have the most unusual combination of devices ever assembled on one boat and two barges of equal size. They have been developed with a view to the employment of railway methods in river transportation. The thought is to have barges comparable to railway cars. Each barge is capable of carrying 75 tons of freight. They are to be coupled together in long lines, of single file or two or three abreast with ends snugly abutting and laying side by side. A special form of coupler is used which resembles the couplers of railway cars. The ends of the barges couple snugly together. But the "train" will be quite flexible and capable of making sharp bends. It follows a serpentine movement, made possible through a flexibility within the barges, which are constructed each with a movable pontoon at one end.

When coupled in trains this pontoon, in effect becomes a part of the adjacent barge hull; each unit hinging between its main hull and the pontoon. The end pontoons carry their share of the weight.

Track absorbs the upward thrust when required and are locked by taper cam-locks when required to perform as a standard barge. Since a multiplicity of bows and sterns will increase the resistance of a tow made up of small units the ends of each of the barges have been made with a decavitating device. It amounts to false ends on each barge which may be raised or lowered so as to bring the bottoms in stream line. By closing the gap between the barges the bottom of the tow is made to resemble the bottom of a single barge. Differences in draught will, of course, cause a corresponding irregularity. But, with the system of adjustable ends employed, no blunt ends are exposed to a direct flow of water, and the stream-line effect is maintained.

The barges are built of copper-bearing steel which resists corrosion, and is said to have unusual lasting qualities. Designed with a view to mass production, they represent a high degree of engineering skill in which advantage has been taken of a number of already developed and proven practices in railway cars. The side doors are, for example, of the standard box-car type, with rollers and catches and were constructed in Chicago.



Bow of one of the barges showing decavitating door and vestibule

The couplers which fasten the barges together and attach the tug to the tow were also produced by a Chicago concern. A screw device is employed by means of which the couplers may be raised or lowered in accordance with the draft of the barges.

The design and construction of these barges is neat and clean cut. The hulls are divided into six water-tight compartments. Two types have been built. One has a flush deck with cargo space only in the super-structure. The other has a drop-deck inside, which gives more head room and provides space for cargo of a bulky nature. The dead weight capacity of both barges is, however, the same.

Aluminum paint is used both inside and outside of the barges and tug as previously stated. It is said, of this paint, that it will reduce the temperature inside of the barges about 8 deg. Fahrenheit in hot weather and that it also prevents sweating. That the latter contention is quite true was amply borne out in our observation of perfectly dry walls of aluminum painted surface as compared to very moist ones of bare steel, both under the same atmospheric and other conditions. The importance of this will be appreciated by anyone realizing the amount of condensate formation in humid districts. Possible accumulation of condensate flowing down from the interior walls onto the steel decks where cargo is stored may cause damage.

The larger barges will be 100 ft. long and 17½ ft. wide, with equivalent capacity to three standard railroad freight cars. They draw 17 in. when empty.

The smaller barges are 50 ft. long and 16 ft. wide, with equivalent capacity to one standard railroad freight-car. They draw

M. V. SUNCO
LIST OF EQUIPMENT AND MANUFACTURERS

Parts	*Manufacturer*
Hulls and Superstructure	Nashville Bridge Co.
Main Engine	Cummins Engine Co.
Chain Drive, Caterpillar Chain, Paddles and Sprocket Wheels	Link-Belt Co.
Clutches	Twin-Disc Clutch Co.
Gears Reverse and Transmission and Universal Coupling	Niles, Bement, Pond Co.
Gear Cutting (Maag System)	Niles Gear Co.
Ball Bearings	S. K. F. Mfg. Co.
Steering Gear	Erico Kainer Co.
Aux. gasoline engine and generator	Brigg S. Straton Co.
Main Generator & Relay Control	Delco-Remy.
Storage Batteries	Willard Storage Battery Co.
Searchlight	Carlisle Finch Co.
Silencer	Maxim Silencer Co.
Whistle	Allan Cunningham & Co.
Air Cylinders and Controls	Logansport Machine Co.
Air Storage Tanks	W. B. Scaife & Sons
Air Compressors (2)	Curtiss Pneumatic Machine Co.
Exhaust Pipe	Pennsylvania Flexible Metallic Tubing Co.
Valves	The Lunkenheimer Co.
Tachometer	Weston Electric Mfg. Co.
Marine Hardware	Carpenter & Co.
Steel Castings	American Steel Foundry Co. & Sterling Steel Co.
Towing Knee Shifting Gear	Yale & Towne Mfg. Co.
Towing Knee Air Motor	Chicago Pneumatic Tool Co.
Large Capstans	American Engineering Co.
Small Capstans	Young Cavil Capstan Co.
Copper-Bearing Steel in Hull Structure	Tennessee Coal, Iron & R.R. Co.
Paint	E. I. duPont de Nemours & Co. & Missouri Paint & Varnish Co.
Handling Gear for Barge Couplers	Foote Bros.
Rust Proofing Processes	St. Louis Rustproof Co.
Rust Proofing Processes	Foote Bros.
Chromium Plating	Vacuum Can Co.
Box-car type doors and barges	Camel & Co.

Generated on 2024-09-13 16:27 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

12 in. when empty and one additional inch for every two tons of load. All barges are designed to load at side or at top.

A future plan of operation involves the bulk of the propelling power coming from a large towboat. A smaller towboat will function as a supplementary guide and become the "switch engine" whenever required. Telephone communication will be maintained throughout the fleet, which offers another possibility for wireless telephony now being developed in New York by the A. T. & T. Co. As the barge fleet goes along the smaller towboat will detach a barge from the fleet, take it to a dock, pick up another barge at the dock, and attach it to the fleet. The barge fleet need not even stop. Wireless telephones as tried on the New York Central Railroad towboats, and in British Columbia, and on Government rum chasers should greatly facilitate this operation.

It is intended that docks and terminals will be worked out on the same general plan of standardization, but flexible methods will be employed to meet varying port conditions and high and low water. Transfer of freight between truck and barge, or freight car and barge, will be made to the towns and cities along rivers now navigated.

At the beginning the Standard Unit Navigation Co. will use two barges and one tug in the upper river service. Plans embrace linking Nashville with way points on the upper stretches of the Cumberland, and include a regular schedule to the lower portion of the river, with service to cities on both the Ohio and Mssissippi rivers.

It is not proposed at present to carry passengers, though plans for passenger boats are being worked out. After the system is established on the upper river it will be extended down stream to St. Louis, up to Chicago, down to New Orleans, thence to other streams and sections of the country.

A.B.N.

All Steel Construction for Fishing Vessel

Great Advantages Claimed For All-Metal Construction Over Old Wooden Fish Boat Types

CALIFORNIA fishing interests are asking if steel is destined to supplant wood in the construction of their large fishing craft, due to developments which have brought about the construction of a Diesel-driven *all-steel* vessel of 112 ft. 6 in. length at San Pedro, Cal.

Just as fishermen on the Atlantic coast are now forced to go off-shore greater distances than heretofore for large hauls of fish, so the Californian fishermen now find it necessary to run 1000 miles and more from supply bases to make their most profitable catches off the Mexican coast. Home waters are becoming depleted of fish. In order to avoid buying a foreign fishing license for Mexican waters and paying duty on their cargoes, American fishermen stock their boats with live bait kept in large bait wells, operate outside the three mile limit and keep their catch in the best of condition by using ice machines.

Naturally the greater cruising radius requires bigger vessels to enable a large, profitable cargo of fish to be carried and to provide sufficient live bait wells and fuel tanks of sufficient capacity. To operate successfully it has been found that a craft at least 100 feet long is needed and that the larger the vessel — within reasonable limits—the more profitably it can be operated. A big boat can carry more bait, remain longer away from the home port and bring back more fish in proportion to her first cost and operating expense than a small craft.

For small boats wood has been successfully used as the chief material in construction for centuries, with steel reinforcing frequently introduced in the larger and longer craft. Therefore, it is interesting to note the reasons for constructing this Southern California fishing vessel entirely of steel.

G. B. Newby, naval architect for the Los Angeles Shipbuilding and Dry Dock Company (who are now constructing this boat at San Pedro for Sousa & Theodora at a cost of approximately $85,000), claims that all boats over 100 feet in length should be built of steel. In designing this new boat, which is sponsored by the San Diego Packing Co., successful fishermen and canners at San Diego and Los Angeles were consulted in order to incorporate all the best ideas in fishing craft. She is expected to demonstrate the advantages of steel over wood construction claimed by Mr. Newby as follows: Less depreciation; greater cargo capacity, bait wells and full tanks; smaller fuel bills and insurance premiums; cheaper upkeep and superior re-sale value.

It is confidently expected that the increased earning capacity and larger yearly profits will more than compensate for the one disadvantage of the steel boat, i.e., 15 to 20 per cent greater cost.

The claim of advantage for the steel vessel is based on her greater rigidity and strength, as the wooden hull is more flexible. This flexibility in a vessel over 100 feet long causes leaks through caulking working out of the seams and weakened joints through "hogging" of the structure. It is claimed that this "hog," or dropping of the ends of the boat, has reached as much as 14 inches out of true in some large wooden craft. A steel hull is kept watertight for a greater length of time than a wooden boat because of this greater rigidity. But this item is a minor one.

More important is the claim that a steel hull lends itself more ideally to the requirements of these fishing craft inasmuch as the large cargo hold, bait wells and bait tanks and the working platform for the men must be as far aft as possible. This layout forces the machinery forward, necessitating long shafts to the propeller. In a wooden boat such long shaft lines are forced out of alignment due to the change in shape of the vessel, causing binding and wear at the bearings, especially when the craft is heavily loaded. In the steel hull of greater strength and rigidity the shafting retains correct alignment, permitting the engines to deliver full power to the propellers for maximum speed.

Hence, Mr. Newby claims greater earning capacity for the steel boat through larger fish cargo holds than a wooden boat would permit on the same length, for machinery can be installed farther forward. A large athwartship fuel-oil tank, extending over a few frame spaces between the engine-room and the insulated cargo hold, provides excellent insulation to prevent the heat of the former from extending to the chilled space.

Placing machinery well forward permits proper trim with large bait wells, bait tanks and cargo hold aft, maintaining the vessel on her lines under all conditions of load by means of a forepeak trimming tank. To provide suffieient displacement forward to accommodate the weight of machinery the model has been given a bulbous forefoot of very full form under water, with liberal flare above water for dryness. This extreme flare also provides splendid deck room for the crew when working forward. The form has been carefully worked out to suit the speed which will be attained.

In the afterbody the hull has been given fairly flat buttock lines with more deadrise near the keel and it is claimed with very good reason that the underbody of the ship is formed to provide better flow of water to the propeller than in the case of the wooden boat where the keel, deadwoods, etc., must be of greater thickness. A thin forged stern post and stern frame greatly assist the flow of water to the wheel, while the wide underbody above provides maximum carrying capacity.

Likewise, the reduced thicknesses of material in the steel vessel advantageously affect the earning capacity by permitting greater net-cargo space on the same outside dimensions of hold, at the same time allowing thicker insulation which will itself save ice. A full scantlinged wood boat of the same outside breadth as the Newby steel craft would require on each side of the boat a reduction of 16¾ inches for ceiling and 7 inches of insulation, which is the thickness used. Doubling this for both sides of the boat means a reduction from the outside breadth of the vessel of 33½ inches.

In the steel hull 7 inches of cork and 2 inches of wood, a total of 9 inches inside the plating, only extends 4 inches inside of the frame. Doubling the 9 inches for both sides is 18 inches inside the plating which is lost from cargo space, 15½ inches less loss than in the case of the wooden boat. This 15½ inches greater breadth of net cargo space the length of the hold increases

Generated on 2024-09-13 16:32 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

earning capacity greatly. The extra thick insulation permitted reduces the size and weight of refrigerating machine needed, lowering the displacement and increasing speed on the same power.

All-steel construction, for the deck houses as well as the hull are of steel, with steel forward deck over the machinery and fuel-oil supply, reduces the fire hazard. Insurance cost is reduced because the fireproof construction confines a fire to the point of origination. A steel deck over the bait wells is being fitted, but over the cargo hold a wooden deck provides a suitable platform on which to land fish.

Construction of steel vessels of small size conforming to American Bureau or Lloyd's requirements will permit more standardized production to uniform scantlings, whereas wood boats are built to various designs and scantlings, with varying insurance risks and premiums. Damage through grounding or collision is more readily repaired in a steel vessel because damage is confined more closely to the point of contact. Injured plates, it is claimed, are more easily removed than wooden planking, framing removed, straightened and replaced.

Certainly operators of large fishing craft will watch with keen interest the results of this innovation in the fishing fleet of Southern California.

Among Pacific Coast Workboats

By H. H. Dunn

The U. S. Fisheries patrol boat CRANE, recently launched at the Johnson yards, Port Blakely, Wash., has been equipped with a 200-hp., six-cylinder, Washington-Estep Diesel. Her sister-ship, TEAL, is driven by a six-cylinder, 150-hp., engine of the same make.

The Bellingham (Washington) Canning Company, has taken delivery on its fifth Diesel-driven tender, the ROBERT A., 72′ x 17′ 6″, with a depth of 9′. Her power plant is a 150-hp., Western Enterprise Diesel, giving her a cruising speed of 9 knots and a radius of about 2,000 miles.

The Diesel-powered, 70-ton trading ship ISKUM, reported lost in Bering Sea in March, came into Unalaska safely late in April, having ridden out extremely heavy gales off the Aleutian Isles. She is owned by the Kanaga Ranching Company, of Seattle.

Equipped with a 360-hp. Diesel engine, the 105 ft. x 25 ft. deep-sea fishing boat FLYING CLOUD, has been launched at the yards of Delano Brusstar, at Long Beach, California, for the Westgate Sea Products Company, of San Pedro. Two other similar craft, now building, also are to be named after famous clipper ships of the past.

Equipped with a 200-hp., Atlas-Imperial Diesel engine, the 83 foot tuna-fishing boat G. MARCONI, was launched recently from the Peter Rask yard at San Diego, for order of M. Crivello & Sons. Speed of 11 knots, with cruising radius of 5,000 miles, is promised. MARCONI has all electric auxiliary equipment, including refrigeration, her capacity being 90 tons of refrigerated fish. A crew of 12 men will be carried and the boat will be used on long fishing trips off the coast of Lower California.

With the great increase in halibut fishing and with new banks found in deeper water, further off the coast of the Pacific northwest, the building of boats for this industry—worth approximately $25,000,000 last year — is showing rapid growth. At Menchion's yard in Vancouver there is building a 56′ x 14′ halibut boat for W. Cook, with a 48-hp., two-cylinder Gardner surface-ignition oil engine. J. Shannon is having completed at the same yard, a similar craft, to be 50′ x 12½′.

The all-steel, steam-driven, government tug IROQUOIS has been purchased by the Cary-Davis Tug & Barge Company, of Seattle, at public auction, for $36,000, and will be converted immediately to Diesel-drive. This tug formerly the FEARLESS, was purchased for $150,000 from the John D. Spreckels Company, in 1898, by the government for use in the Spanish-American war. She was built in San Francisco.

Fred Canapa & Sons are having built at the Rask yard in San Diego, a 108′ Diesel powered fishing boat, with accommodations for a crew of 12 men and a cruising radius of better than 5,000 miles. She is to be equipped with a 300-hp. Union Diesel engine, and will be completed in August.

The Rask yard also has launched ST. THERESE, 108′ long, another tuna-fishing boat, for Frank P. Silvas & Sons, to be operated in the Lower California fisheries by the Cohn-Hopkins Canneries company. THERESE is having installed a 375-hp., Western Enterprise Diesel engine, which is to give her a speed of 12 knots, while her cruising radius will be 6,000 miles or better. She will have a double deck cabin and double deck controls, with a crew of 12 men. An unusual feature is a complete chapel on the main deck, where services can be held every day while at sea.

One of the most interesting towboat conversions of the year on the Pacific Coast will be that of the famous 42 year old Navy tug, VIGILANT, bought at auction at Mare Island late in April for $9750 by George R. Cary of the Cary-Davis Tug & Barge Company, of Seattle. A 500-hp. Diesel, of make not yet decided, is to be installed in place of the steam engine now in the historic tug, and work of taking out the latter has been started at the Washington port. VIGILANT, an iron hull, was built at Cramps yards, Philadelphia, and purchased by the Spreckels interests and brought to the coast. She was taken over by the government at the beginning of the Spanish-American war and has been "in the navy" ever since. She is 116 feet long with 25-foot beam, drawing 12 feet aft. Her new station, after conversion is completed, will be on Puget Sound.

Somewhat novel in design is the latest of the Columbia River trolling fleet, SARAH E., built by the Astoria Shipbuilding Company, Astoria, Ore., for Captain C. H. Foster, of Aberdeen, Washington. She is 45 feet long, 11½ feet beam, and 6 feet deep, driven by a 30-hp., Atlas-Imperial Diesel, giving her a cruising speed of 10 knots. Joseph M. Dyer, of Astoria is the designer. Widely flaring bows make her a dry boat, give increased deck space forward, and help with her speed. Forward, below the water line, SARAH E., shows fuller lines than most troller hulls, helping to keep her from plunging in heavy seas, and giving greater buoyancy to her bows. She has a raised forecastle, which is entered only from below decks, and the steering and engine controls are carried aft into the fishing cockpit from the wheelhouse. There are one-man controls in both house and cockpit, and exhausts are through a hollow steel mast. Auxiliary equipment is electric.

Two 95-foot, cork-lined, refrigerated fishing boats are nearing completion at the yards of the San Diego Marine Construction Company. One of these is for order of Guy Silva, and will have a 360-hp., Fairbanks-Morse, direct-reversible Diesel engine, with all auxiliaries electric, including the refrigeration plant. The second, for M. M. Perry, will have a 300-hp., Atlas-Imperial, direct-reversible Diesel, with auxiliary equipment driven from a line-shaft. Other than their propelling and auxiliary plants, the hulls are exactly alike, each being 95′ x 23′ with 7′ 6″ drafts.

PROFESSIONAL CARDS

GEORGE G. SHARP
Naval Architect—Engineer—Marine Surveyor
30 Church Street — New York City
Motor Vessels
Design—Supervision—Survey
Tel. COR tlandt 5184 — Cables SEACRAFT, New York

ANGELO CONTI
Naval Architect & Consulting Engineer
Specializing in Diesel Installations
11 Broadway, New York, N. Y.
Tel. Bowling Green 0376

J. Barraja-Frauenfelder & Co.
Consulting Diesel Engineers
Research and Experimental Work
Designs, Specifications, Estimates, Appraisals, Industrial, Railroad and Marine Conversions—
1600 Walnut Street — Philadelphia, Pa.

Classified Advertisements
75 cents per Line, 5 line Minimum. Payable in Advance.

Generated on 2024-09-13 16:42 GMT / https://hdl.handle.net/2027/mdp.39015026088776
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN